AVIATION AND AIRCRAFT JOURNAL

SEPTEMBER 12, 1921 VOL. XI. NO. 11

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INDEX TO CONTENTS

Editorials	303	Major Schroeder with Underwriters	311
Wadsworth Aviation Bill	304	Who's Who in American Aeronautics	312
Prague Aero Show	306	Aircraft and Disarmament	315
Fokker Operating Costs	306	Naval Bureau of Aeronautics	315
Diggins School	306	Glenn Martin High Lift Wing	316
New System of Bombing Tests	307	Safety Tanks for Aircraft	318
High Efficiency of Seaplanes	308	Oehmichen Helicopter	319
Aero Group in Italian Parliament	308	Airdrome Notes	320
Aviation in Australia	308	Gallaudet Plant	320
Barnhart "Wampus-Kat"	309	South American Altitude Mark	320
The Air Mail	311	Pioneer Instruments for Navy	320

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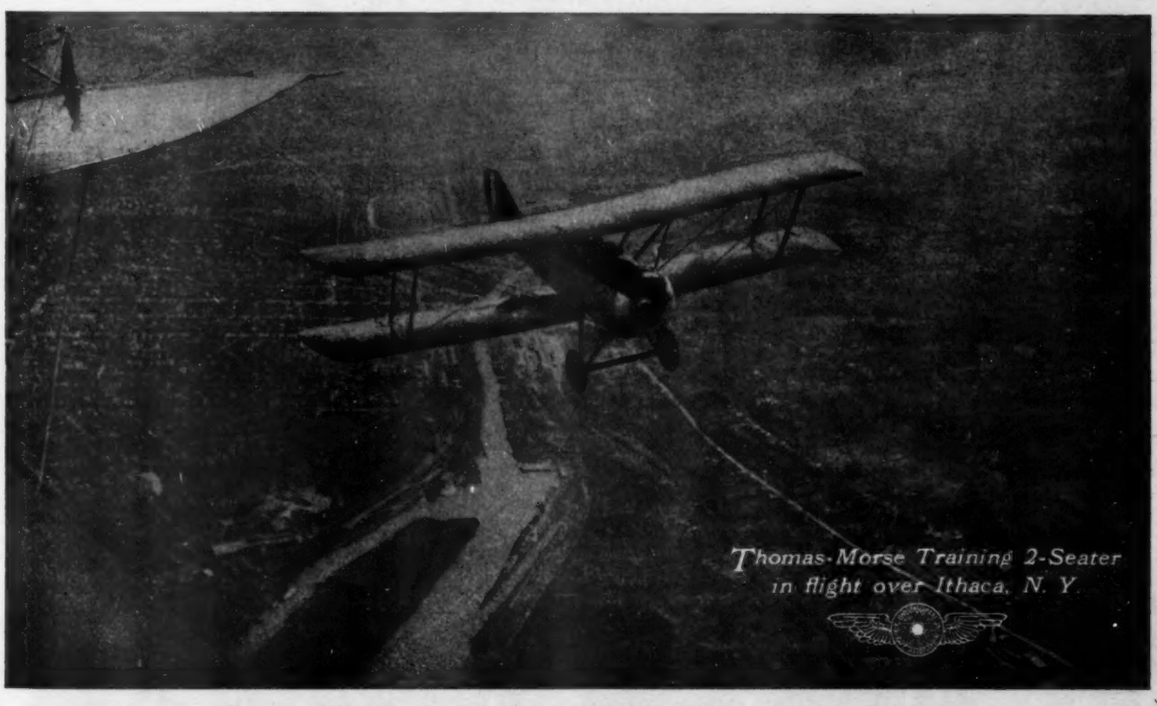
THOMAS-MORSE AIRCRAFT CORPORATION



Thomas-Morse Training 2-Seater in flight over Ithaca, N. Y.

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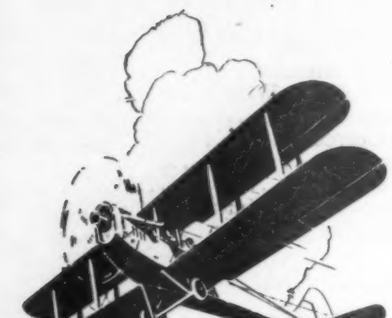
SPEED



Does it mean anything to you to save time?

Why do you travel by motor-car rather than by horse and buggy? Why the telephone?

Have you in mind a city which you visit often? Some city, say, only two hundred miles distant on the map, but eight or ten hours away by smelly train that runs very seldom and always at just the wrong time. And the roads are always bad just when you want to go by automobile, having missed the train.

The next time such a trip makes you downright disgusted with life: - Imagine yourself "hopping over" in an hour or two, leaving when most convenient, and enjoying an invigorating sight-seeing trip.

Of course landing fields at both ends are required; but we must wake up to the fact that landing fields are infinitely cheaper, and are of proportionately much more direct advantage to the city in each case, than connecting rail - or auto - roads.

Air travel is coming. It is fundamental that any vehicle which permits material saving in time of transportation must eventually become an economic necessity.

Don't let other towns profit by air travel at your expense simply because your particular town will not prepare for it.

Vote for Your Municipal Landing Field

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"The birthplace of the airplane"

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AVIATION AND AIRCRAFT JOURNAL

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Regarding the Schneider Cup

THE fifth international contest for the Schneider Marine Flying Cup ended like the two preceding ones with an Italian victory. It is necessary to qualify the term "international contest", as outside of the Italian defending team only a single French challenger showed up, and he was eliminated in the preliminaries by float trouble. As a result the Italians had the race all to themselves and duly won it.

As the Schneider Cup must be won three times in succession to become the permanent property of the winning country, Italy would be the rightful holder of the trophy were it not that Janello's victory, in 1919, was declared invalid on the grounds of a technicality. That year the race was run under conditions of low visibility and the British and French contestants soon fell out for various reasons, so that Janello, on a Savoia flying boat, was the only pilot to finish the course. Unfortunately for him he regularly rounded one buoy which he had mistakenly believed to be a marker and he was thus deprived of the victory. To recompense Italy for the effort, however, the F.A.I. entrusted that country with the organization of the 1920 contest and this was again won on a Savoia, by Commander Bologna, the British and French contestants being once more eliminated by various troubles. The 1921 contest was merely a repetition of previous performances, except that the challengers had dwindled down to a solitary Frenchman, and the race was won by De Briganti on a Macchi flying boat.

America did not participate in any of the post-war contests for the Schneider Cup. That this is a highly regrettable state of affairs will be readily conceded. The Schneider Cup holds the same relation to marine aviation the Gordon Bennett Cup held to land flying until it was finally won by France. It is an international criterion of seaplane excellency and the winning firm—not to speak of the whole aircraft industry of the victorious country—naturally derives considerable benefit from the publicity that goes with the winning of the trophy.

That these are not vain words may be seen from the fact that since Italy has become a sort of a permanent winner of the Schneider Cup her seaplane industry has found profitable markets in France, Spain, Holland, Scandinavia, etc., and all this at the expense of American, French and British constructors.

Such being the case it would seem highly desirable that American seaplane constructors seriously consider the advisability of building challengers for the 1922 Schneider Cup race, which will afford them *their last chance* of bringing that trophy to America. This is surely worth a serious effort. After all it is America who invented both the float and the boat type seaplane; who produced the first workable twin engined flying boat, the America; and who created the remarkable multiple engined NC flying boat which was the first of all aircraft to cross the Atlantic. This all too short list of American achievements in seaplane construction is a brief that our engineers and designers are fully capable of producing a seaplane capable of winning the trophy. As to the expense involved it would seem that, considering in particular the low rate of exchange, the cost of sending a challenging team into Italy could be kept within reasonable bounds, while on the other hand the cost of constructing the machine would be well worth the efforts of an enterprising firm. It should be noted that a racing machine is never a dead loss to a firm, for it generally marks the starting point of a new pursuit machine, beside embodying numerous detail lessons which cannot be learned in any other manner. Thus, the design of a Schneider Cup challenger may cause our constructors to develop single-seater pursuit seaplanes capable of rendering valuable service in coast defense work.

Almost a year remains for perfecting such plans. The time is thus plentiful to evolve a suitable design, to build it, and to test it extensively before the race. The last Gordon Bennett race taught us what lack of adequate preparedness leads to; do not let us repeat the performance if we are to compete for the Schneider Cup.

A Lesson

THE White Star Line S.S. Olympic recently arrived in New York from abroad. She was overdue having been delayed outside New York by a fog which required her commander to radio ashore to that effect.

While we bear no ill will toward the Olympic or those associated with her, we confess to a certain degree of satisfaction at this recent delay of so great a factor in transport as this ship undeniably is. The reason for our satisfaction is that a comparatively unimportant and oft occurring incident, such as the one just related, among steamships carries a lesson for the public at large who at the present time seem doubtful, to say the least, as to the reliability or otherwise of aerial transport. That they are justified in adopting this attitude cannot be denied considering the manner in which aerial transport is at the present being handled in this country. That travel by air is made more reliable by delay in other forms of transport we do not go so far as to claim. But we do claim that a delay on the part of an aircraft corresponding to the recent delay of the Olympic would have evoked a far greater protest from those directly affected than that of the ship evoked from her passengers.

Of course very few of the public will benefit from this lesson. Somehow or other the public have an exasperating way of never noticing what would be most to their advantage to notice. All who are interested in the success of commercial aviation should work constantly to thrust upon the public such lessons as the one just related. Only in this way will the development of aviation be realized by those whose support will make it a commercial success.

The Wadsworth Aviation Bill

Important Measure to Create Bureau of Civil Aeronautics

While many bills have been introduced in both Houses of Congress with a view to organizing some governmental agency for the control of civil aviation, the one that promises to have the greatest chance of success is S. 2448, which was introduced by Senator Wadsworth of New York on Aug. 22.

The civil aviation bill which up to this time had the strongest backing was the bill H.R. 271, introduced by Representative Hicks at the request of the National Advisory Committee for Aeronautics and recommended by President Harding in his letter to Congress of April 19. This bill, however, was criticized so severely by the Special Committee on the Law of Aviation in its report to the American Bar Association, that it is probable that no serious attempt will be made to urge its passage. The report in considering the bill sponsored by the National Advisory Committee for Aeronautics says:

Report on the Hicks Bill

The bill proposes the formulation of rules and regulations by the commissioner of air navigation, for whom it provides, and their approval by the Secretary of Commerce, and makes them binding and enforceable from the date of promulgation. It apparently contemplates the most complete and exclusive control within the United States of the entire subject of air navigation, including aircraft, personnel, management, airdromes, landing fields, aerial routes. It prohibits the use or operation of aircraft within the United States without a license from the commissioner of air navigation (subject to certain exemption by treaty or convention); it restricts the ownership of aircraft, provides for annual licenses, and gives inquisitorial powers to the commissioner. It prohibits the operation of airdromes except under similar license and similarly restricts the ownership of airdromes. It authorizes the commissioner to fix the license fees subject to the approval of the Secretary of Commerce (thus, we assume avoiding the contention that this can be justified as tax legislation); it imposes severe penalties for violation and confers jurisdiction upon the federal courts. It declares such portions of the air as are navigable by aircraft and all aircraft navigating the air to be within the admiralty jurisdiction of the federal courts (thus apparently claiming by Congressional action the power to establish a jurisdiction not conferred by the Constitution, by declaring the subject matter to be within a jurisdiction which was constitutionally conferred). It confers jurisdiction upon the district courts, of all cases involving air navigation and aircraft; it saves to suitors a common law remedy where the common law is competent to give it (not, however, otherwise indicating where or in what courts the common law remedy is to be enforced). It extends the maritime law and laws relating to watercraft and water navigation to aircraft and air navigation so far as applicable (thus creating a fruitful field for controversial litigation and a degree of legal uncertainty until after an event), and except (among other exception) as modified by the rules and regulations (thus apparently conferring or attempting to confer upon an administration officer the power to modify a law), it contemplates its own partial invalidity by saving the parts not held to be invalid.

It recognizes the continued existence of the states by authorizing the Commissioner of Air Navigation to cooperate with the various states, cities and municipalities for the purpose of setting aside and establishing airdromes and landing fields to be used in common by federal, state, municipal, commercial, and private aircraft, but under the rules and regulations to be promulgated by the commissioner.

While the members of this committee share the common view that the best interests of aeronautics demand that the power of the federal government shall be extended (but by constitutional amendment) to this subject matter, they do not regard the existence of the subject matter as sufficient excuse for ignoring either the Constitution or the states; nor do they consider that a new subject matter is within a constitutional category because it suits somebody to put it there. The bill itself tacitly acknowledges that the subject matter is not within the admiralty jurisdiction conferred by the Constitution when it naively provides that the maritime law shall be held to govern so far as applicable and except as modified (among other methods) by the rules and regulations promulgated by the Secretary of Commerce.

The Constitution says: "The judicial power shall extend ..... to all cases of admiralty and maritime jurisdiction" (Art. III, s.2). The bill declares that navigable air and aircraft navigating the air are within the admiralty jurisdiction of the federal courts, but that maritime law shall be held to govern aircraft and air navigation only in so far as applicable thereto and as not modified (among other things) by the Secretary of Commerce. This provokes the inquiry whether it does not attempt to impair the constitutional judicial power by grasping the subject matter as within the category, and then making the law of the category in part inapplicable.

It does not seem to us that these problems of fundamental constitutional importance should be viewed with indifference either by the members of the American Bar Association or the public. The interests of aeronautics demand adequate legislation, but they do not demand the ignoring of constitutional limitations, nor the impairment, except by proper constitutional amendment, of the powers of the states.

We have thus analyzed this bill (which also prospectively contemplates that it may be utilized to enforce a treaty or convention, not yet entered into) because it is advocated by the National Advisory Committee for Aeronautics, and is approved by the President in a special message of transmission to Congress.

The Wadsworth Bill

The Wadsworth Bill, which is believed to avoid all of the criticized points of the National Advisory Committee's Bill, is printed herewith in full so that it may have the careful consideration of all interested in the advancement of civilian aviation.

At the time this Bill was introduced, Senator Wadsworth stated: "This bill provides for the control, regulation and development of civil aviation. In line with the recommendations made by President Harding in his inaugural message, it establishes a bureau of aeronautics in the Department of Commerce, thus providing commercial flying with a centralization already possessed by the Air Services of the Army and Navy. Through control, regulation and development, civil aviation can make a real contribution to our transportation needs, particularly in the carriage of mail, and at the same time provide an economical and indispensable reserve for the military and naval services. Already 1,200 commercial aircraft are in operation, but due to the lack of Federal control there were forty serious accidents in civil aviation the first six months of the year in which fourteen persons were killed and fifty-two injured. Of equal importance with the inspection and laying out of air routes is the establishment of terminals and the provision of means for disseminating weather reports and operating signals for aviators—all provided by this bill. This bill is also designed to correct a curious and extraordinary situation that is developing in customs and quarantine. Smuggling of persons and goods—including liquor—is easier by air than by many other methods, and contraband flying cannot be controlled except by special law with all the force of the Government behind it. This bill was prepared in response to the urgent solicitation of a score of organizations throughout the United States representing the operating, engineering, constructing, commercial and sporting elements in aviation. Its early enactment is imperative as a means of saving life and property, aiding our economic development and strengthening our national defense."

IN THE SENATE OF THE UNITED STATES.
August 22, 1921.

Mr. WADSWORTH introduced the following bill; which was read twice and referred to the Committee on Commerce.

A BILL

To create a Bureau of Civil Aeronautics in the Department of Commerce, to encourage and regulate the operation of civil aircraft in interstate and foreign commerce, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled, That there is hereby established in the Department of Commerce under the jurisdiction of the Secretary thereof a bureau to be known as Bureau of Civil Aeronautics.

SEC. 2. That a Commissioner of Civil Aeronautics shall be at the head of such a bureau, who shall be appointed by the President by and with the advice and consent of the Senate, who shall receive a salary of $7,500 per annum. There shall be also an Assistant Commissioner of such bureau who likewise shall be appointed by the President by and with the advice and consent of the Senate, who shall receive a salary of $5,000 per annum. The Assistant Commissioner shall perform such duties as may be prescribed by the commissioner or as may be required by law. There shall be also a chief clerk of said bureau, and such other deputies, assistants, and employees as may be required from time to time and as may be authorized by law.

Sec. 3. That it shall be the duty of the Commissioner of Civil Aeronautics in conformity with the provision of this Act—

(a) To inspect the design and construction and, if approved, to license the operation of civil aircraft, in order to safeguard life and property.

(b) To regulate the navigation and operation of civil aircraft through the establishment of aerial traffic rules and regulations in order to safeguard life and property.

(c) To foster civil aeronautics—(1) by designating, approving, mapping and laying out air routes; (2) by establishing and encouraging the establishment of landing fields and air stations; (3) by establishing and operating meteorological services in cooperation with the other departments of the Government; (4) by establishing and operating communication and signaling systems; (5) by studying the development of aeronautics in the United States and other countries and by the collection and dissemination of information relative thereto.

(d) To encourage or undertake such aeronautical investigations and research as may be of value and to cooperate with other institutions to that end.

(e) To cooperate through proper governmental channels with the air staffs or other authorities of foreign governments, for any purpose pertaining to civil aeronautics.

(f) To operate such air services as the Secretary of Commerce may deem necessary for inspecting, licensing, regulating, and controlling the operation of civil aircraft and the mapping and laying out of air routes and airdromes and air stations and the policing thereof.

(g) To establish and administer regulations in conformity with and carrying into effect international aeronautical agreements and treaties.

SEC. 4. That, subject to the approval of the Secretary of Commerce and for the purpose of making effective the provisions of this Act, the Commissioner of Civil Aeronautics shall by regulation provide for—

(a) Licensing pilots and such other persons engaged in the navigation or operation of civil aircraft as may be required for the public safety and when necessary the suspension or revocation of such license.

(b) The registration, identification, inspection, certification, or licensing of all civil aircraft and when necessary the suspension or revocation of such licenses.

(c) The registration, identification, inspection, certification or licensing of all civil airdromes or air stations and when necessary the suspension or revocation of such licenses.

(d) The conditions under which civil aircraft may be used for carrying and transporting persons or property, or for the operation of any civil aerial service whatsoever, and the licensing of any such sevice.

(e) The prohibition of the navigation of civil aircraft over such areas as may be specified for military, naval, postal, or other purposes, either temporarily or permanently, and either absolutely or subject to such exemptions or conditions as may be prescribed.

(f) The manner of using air routes and the utilization of air navigation facilities and appurtenances.

SEC. 5. That all rules and regulations authorized under the provision of this Act shall be formulated by the Commissioner of Civil Aeronautics and they shall then be recommended to the Secretary of Commerce and upon the latter's approval such rules and regulations shall be promulgated by him and shall have the effect of law and be enforceable from the date of such promulgation unless otherwise provided therein. The Secretary of Commerce, upon similar recommendations, shall have the power to amend, alter, suspend, or revoke such rules and recommendations and to promulgate new rules and regulations from time to time.

SEC. 6. That, subject to the approval of the Secretary of Commerce, the Commissioner of Civil Aeronautics shall cooperate with other departments of the Government to establish the conditions under which persons may be carried and property imported and exported in civil aircraft, from, into, or through the United States, its Territories and dependencies, and to prescribe the areas within which aircraft entering the United States, its Territories and dependencies or the waters thereof, are to alight and the conditions to be complied with by such aircraft.

SEC. 7. That the word "aircraft" as employed in this Act shall embrace every type of flying machine, conveyance, or vehicle now known or hereafter invented, devised, or developed, whether or not used in the carriage or transportation of persons or property, or without persons or property, flown, operated, or navigated in or through the air, and shall include airplanes, hydroplanes, seaplanes, balloons, dirigible balloons, and all similar conveyance or vehicles.

SEC. 8. That it shall be unlawful to fly or to navigate or operate any civil aircraft in violation of the provisions of this Act, or of any rule or regulation promulgated in conformity therewith, or to fly or to navigate or operate any civil air craft in interstate or foreign commerce, or in, over, upon, or along or through navigable streams, rivers, or waters, or post roads or routes of the United States, or the air or atmosphere above the same, or in, over, or through the District of Columbia, the Territories, dependencies, reservations, national parks, or over any place or building over which the United States has jurisdiction, or to maintain or operate any airdromes or air station over which the Bureau of Civil Aeronautics may exercise jurisdiction except in conformity with the provisions of this Act and such rules and regulations as may be promulgated pursuant thereto.

SEC. 9. That any violation of the provisions of this Act, or of any rule or regulation promulgated in conformity therewith, shall be punishable by a fine not exceeding $1,000 or by imprisonment for a term not exceeding one year, or both.

SEC. 10. That the provisions of this Act and the rules and regulations promulgated thereunder shall not apply to individuals, aircraft, or airdromes, or airstations under the control of other departments of the United States Government, except where use is made by the personnel or aircraft of such departments, of equipment, airdromes, or facilities licensed and controlled by the Commissioner of Civil Aeronautics, in which instances the rules and regulations promulgated by the Commissioner of Civil Aeronautics shall be observed.

SEC. 11. That the Commissioner of Civil Aeronautics and such deputies as he may designate shall have power to conduct hearings, to subpoena witnesses, to send for documents and other papers, to administer oaths, and to take such testimony as may be necessary in determining the qualifications of individuals for licenses or registration certificates to operate aircraft, airdromes, or air stations, or in the suspension or revocation of such licenses or registration certificates, or to enable him, or them, to make effective any of the provisions of this Act, or any rule or regulation promulgated in conformity therewith.

SEC. 12. That the Commissioner of Civil Aeronautics is

authorized, subject to the approval of the Secretary of Commerce, to fix the fees and charges for such inspection, registration, and licensing authorized by this Act, which fees and charges shall be collected by the Commissioner of Civil Aeronautics and covered into the Treasury of the United States to the credit of miscellaneous receipts.

SEC. 13. That the Commissioner of Civil Aeronautics shall prepare and keep available at all times an up-to-date comprehensive survey and inventory of all of the civil and industrial aeronautical resources within the United States, its Territories and dependencies or the waters thereof and shall publish quarterly a bulletin setting forth all licenses issued, together with field reports of all flying activities, accidents, and field and route data, under the control of the bureau.

SEC. 14. That the Commissioner of Civil Aeronautics shall annually, at the close of each fiscal year, make a report to the Secretary of Commerce, giving an account of all moneys received and disbursed by him and describing the work done by the bureau, and the Secretary of Commerce shall transmit such report to Congress with the annual report of the Department of Commerce.

SEC. 15. That the district courts of the United States shall have exclusive jurisdiction over all claims and controversies involving aircraft, airdromes, and air stations, their owners, lessees, charterers, and operators licensed hereunder, with the right of appeal as in other cases. The law and procedure to be applied in determining such claims or controversies whereever arising, whether on land, water, or in the air, shall conform as nearly as may be to the principles of law and procedure applied in cases of admiralty jurisdiction. The owners, lessees, charterers, and operators of such civil aircraft, airdromes, and air stations shall be entitled to the same measures of exoneration from the limitation of liability as are provided for the owners, lessees, charterers, and operators of vessels by section 4281 to 4286, both inclusive, of the Revised Statutes of the United States, section 18 of chapter 121 of the Act of Congress of June 26, 1884, and the Acts amendatory thereof and supplemental thereto; and the rules of the Supreme Court of the United States and of the inferior United States courts relating to limitation of vessel-owner's liability as now in force or as may be hereafter promulgated shall be applicable to claims and controversies involving such aircraft, airdromes, and air stations, their owners, lessees, charterers, and operators.

SEC. 16. That all salaries provided herein and all expenses incurred under the provision of this Act shall be paid out of such money as may be appropriated therefor by Congress.

SEC. 17. That if any portion of this Act be declared invalid it shall not affect any of the other portions thereof, which other portions shall continue in full force and effect.

SEC. 18. This Act shall take effect from and after the date of its passage, and all Acts or parts of Acts inconsistent herewith are hereby repealed.

Fokker F-3 Operation Costs

The following operation costs of a Fokker F-3 all metal monoplane are based on a paying load capacity of 1000 lb. during 37½ hr. flying during 17 days of July and August. During this time 449 passengers were carried.

Miles covered	3,400
Gas, 310 gallons	$ 68.20
Oil, 26 gallons	20.80
Depreciation, Write off $20,000 in 3,000 hours —37½ hrs.	247.00
Pilot at $400 per mo.	227.00
Insurance, 11% in 6 mo.	205.50
Hangar $8,000 write off in 10 yrs.	32.50
1 helper at 25 wk.	30.00
Total cost for 3,400 miles	$831.00

Equals 24.42 cents to 25 cents per mile for 5 passengers and pilot and baggage.

Nebraska State Air Association

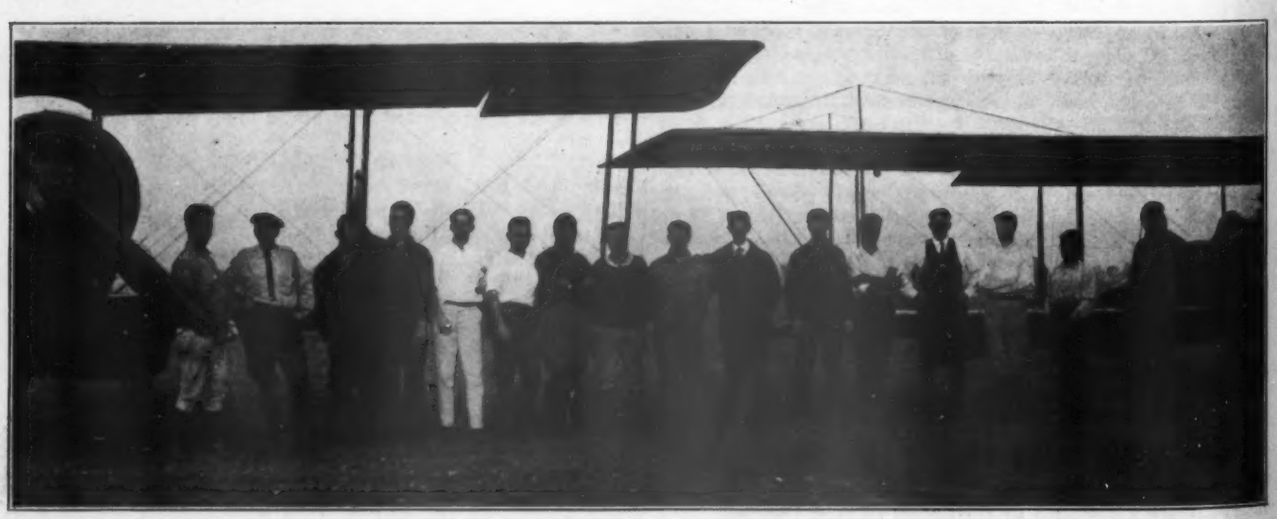
The Nebraska State Air Association was organized at a recent meeting in Lincoln. Temporary officers were elected to serve until the convening of the International Aero Congress at Omaha in November at which time permanent officers will be elected. The purposes of the association as embodied in a resolution passed at the meeting are in brief; to advance the development of the science of aeronautics, to encourage aerial navigation, conferences, etc.; to cooperate with the federal government and postal service along these lines; to support a policy which will enable the government to improve aerial defense so that the United States may keep in pace with the other first class powers of the world; to maintain headquarters and advocate the establishment of training fields; to encourage the passage of laws governing aviation, and to assist the formation of a national air body concentrating the work in the various states with the hope of centering the work of the different states in one national organization and the development of aviation in America.

The Diggins School

The accompanying photograph shows the last class to be graduated from the Diggins School of Aviation at Chicago, standing in front of two of their training machines.

The school has graduated 65 pupils so far this year without an accident. Among the pilots graduated were several from foreign countries, including Japan and China.

The machines used for instruction are for the most part Canadian Curtisses and Avros. During the month of July the chief instructor, James Curren, made more than 2,600 flights for a total of about 216 hr. flying time.



AUGUST CLASS OF THE RALPH C. DIGGINS SCHOOL OF AVIATION, CHICAGO

A New System of Bombing Tests

By Lt. Col. A. Guidoni

Air Attache, Italian Embassy, Washington, D. C.

Through the courtesy of the Navy Department I was able to witness all the bombing tests of the ex-German ships and although the ability and efficiency of the United States aviators is well known in Italy, I did not expect such a precision in the results.

The targets were literally covered either with direct hits or with close ones, and for the Ostfriesland it was evident that the aviators could take a good aim at the fore and aft ends of the ship, and at the unprotected parts of the ship as well, choosing the aiming point.

I have been dealing with aeronautics since 1910 and, being also a Naval Constructor, I am able to look at the controversy from both sides.

When the Ostfriesland was sinking, I overheard many officers say that the ship was obsolete; it would be a very good thing therefore, to know, if the new battleships and battle cruisers can withstand the effect of aerial bombs and remain afloat after a terrific blow of 2000-lb. and 4000-lb. bombs. Now although the United States is a wealthy nation it cannot afford to spend $50,000,000 for a ship to be bombed.

The only solution of the problem, is then to build a model of the ship, on a very small scale (for instance 1/20) and to explode in spots chosen by the operator, some small charges, their weight corresponding to that of the bombs of real size. There are definite laws connecting the weights of charges and the scales of models, so that the effects of explosion will be the same on the model and on the ship.

It is not necessary to recall the advantages of such a system of tests. Economy, secrecy, and exact knowledge of the results, as after the test the model can be lifted from the water, are the most important points. I proposed this system in Italy in 1910 and it worked very well, giving interesting results on many questions; and in 1916 hundreds of tests were made to get the effects of gun fire, with the same good results.

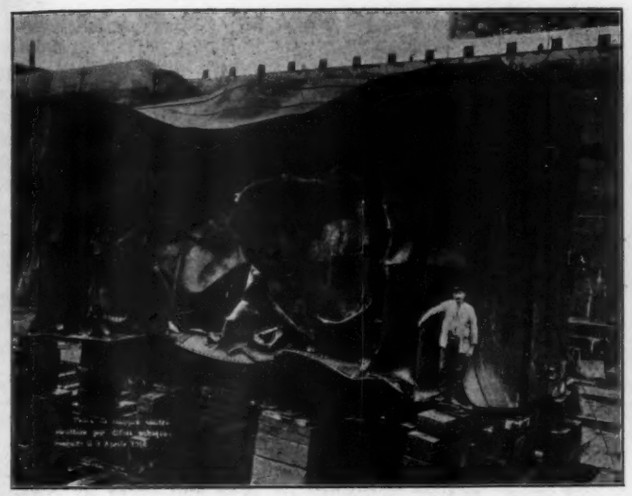
The attached photographs show a ship's structure in full size and its model in scale 1/20, after submarine explosions. The perfect correspondence of the effects on the plates is a remarkable one.

In following this system it is possible, with very little expense, to find out not only what would happen to real ships, but in modifying the structures and repeating the tests it is possible to improve the power of defense, reducing its weight. In varying the charges and their shapes it is also possible to get a definite conclusion regarding the most efficient size of bombs.

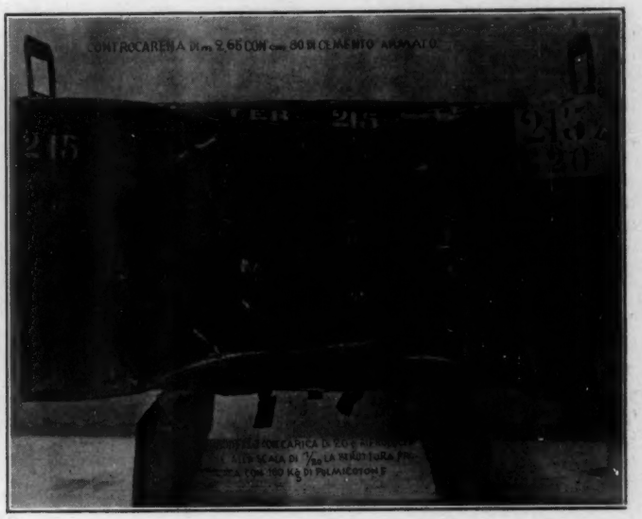
In testing the model of the whole ship, instead of only the part submitted to the explosion, there is the great advantage of finding out the secondary effects of explosion, which can be found at a great distance from the point of hitting. A ship hit by a bomb may sink after three or four hours from leakage of the bulkheads; and this effect cannot be observed in a model which comprises only a part of the hull. If the effects of the explosion are wanted for armored decks and gun turrets, funnels, etc. the model ought to be completed with those parts.

A model of the new battleship would be 30 ft. in length; and this is sufficient to prove that the expense would be very small.

Only experimental researches can give the naval constructors all the information required to build battleships which can withstand the effects of the new aerial weapons.



SECTION OF FULL SIZE SHIP'S STRUCTURE AFTER SUBMARINE EXPLOSION



SECTION OF A 1/20 SCALE MODEL SHIP'S STRUCTURE DAMAGED BY SUBMARINE EXPLOSION

Some New Aerodynamical Relations

N.A.C.A. Report No. 114

Report No. 114 entitled "Some New Aerodynamical Relations," by Max M. Munk, contains three new relations extending the modern theory of aeronautics, intended to be applied in some later papers. They deal with phenomena in a frictionless fluid.

The first part contains a relation between the power absorbed by an aerofoil and the power absorbed by a propeller. In the second part the exactness of the ordinary formula for the induced drag of an aerofoil is examined and the error is determined.

In the third part the author shows that for the calculation of the air forces on bodies of considerable volume the imaginary sources and sinks equivalent to the flow around the body can be used in the same way as vortices are used for the calculation of lift and induced drag of wings.

A copy of Report No. 114 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Stockholm-Reval Airline

The Svenska Lufttrafik company has recently put into operation an air service between Reval and Stockholm using Italian seaplanes, Savoia type S16. The initial trip was done in three hours with a load of three passengers and mail. The company is planning the extension of the line to Helsingfors.

High Efficiency of Seaplanes

By G. Pegna

In the January number of *Le Vie del Mare e dell'Aria* Engineer Luigi Acampora in connection with the last international seaplane contest, which was won by the Savoia S12 built by the Societa Idrovolanti Alta Italia of Sesto Calende (Milan), makes some remarkable statements concerning seaplanes in general and this machine in particular. These statements seem worth repeating in their essential parts.

There is a universal impression that the efficiency of airplanes is greater than that of seaplanes, perhaps because in the latter greater head resistance is offered by the hull, and the engine requires a separate cockpit, while in airplanes it is usually installed in the fuselage. Pegna† and Magaldi, observes Acampora, have repeatedly, with ample technical arguments, demonstrated the incorrectness of this opinion, showing that seaplanes need not be inferior in performance to land machines. But here Acampora adds on his own authority that, by analyzing the efficiency of the S12, he was able to confirm its superiority over many land machines of similar speed and load, even the newest and best. Of which fact the constructing firm can be justly proud, all the more because the S12 was projected by Conflenti at the end of 1917 as the result of designs submitted at that time to the Technical Military Administration.

Desiring to make an analysis of efficiency, *L'Aeronautica* had recourse to a "figure of merit" or "index of efficiency" which had been established by a technical commission, after having been the object of much discussion in 1919. Professor Anastasi proposed

$$\text{Index of Efficiency} = \frac{Q\,D\,V}{C}$$

in which Q = commercial load, D = operating range, V = speed corresponding to D, C = weight of fuel and oil required for attaining the operating range D at the speed V. Other formulas more or less similar were proposed by other technicians and the commission finally decided to adopt the following

$$I_r \text{ (Index of efficiency)} = \frac{QD}{C}$$

in which Q = commercial load, D = operating range, and C = weight of fuel and oil necessary to attain the range D with normal load. This formula was published in the official proclamation of the contest.

It is therefore proper to use this formula, with the adoption, however, of the following regulations:

a) To classify aircraft of a total minimum load of about 800 kg.

b) To determine a fixed operating range, corresponding to the mean radius of action adapted to the aircraft under investigation, namely 800 km.

c) To assume for all a total hourly consumption of 250 g. of fuel and oil per horsepower in order to avoid confusing the coefficient of the thermodynamic efficiency of the engine.

d) To consider that the crew consists of a single pilot weighing 75 kg.

e) To consider as the commercial load the remainder of the total load, after subtracting the weight of the pilot (75 kg.) and of the fuel and oil consumed for a fixed range of 800 km.

We thus obtain the following table, whose data for calculating the index of efficiency are taken from the last official publication of the Direzione Technica Aviazione (Technical Aviation Administration) for Jan. 1, 1920, and from other foreign documents.

The value, superior to all others of the index of efficiency of the S12, fully demonstrates our claims regarding its indisputable superiority and, in regard to the high efficiency of seaplanes, that the latter can not be held inferior, a priori, to land machines.

* Translated from *L'Aeronautica* Jan.-Feb. 1921, by N.A.C.A.

† In acknowledging Acampora's friendly mention of myself, I wish to express the conviction I have held for some time that the maximum speeds of aircraft above a certain power, will be obtained by seaplanes.

Aeronautical Group in Italian Parliament

Fifty Representatives of the Italian Parliament have formed an "aeronautical group" which intends to pay special attention to aeronautical questions, with particular reference to commercial aeronautics and international aerial navigation.

The president of the group is Hon. Turati, the well known Socialist leader; the secretary is Hon. Finzi, the Italian Air Force pilot who participated in the raid on Vienna during the war.

At its first meeting the group has considered the bills before Parliament dealing with aeronautics and the ratification of the International Convention of Aerial Navigation.

Hon. Gasparotto, who was one of the most active members of the group, is now Secretary of War and great improvements in civil and military aviation are expected from his appointment.

Aviation in Australia

Details of the arrangements for a trial contract for an airplane service, including the carriage of mails, from Geraldton to Derby (W. A.), a distance of 1,195 miles, were recently announced by the Minister of Defence. Tenders will be invited from private firms. There will be one trip each way every week, and persons employed must be enrolled and remain as members of the Australian Air Force. The service is to commence about October 29, 1921, or on such subsequent date as may be approved. A ground survey of the route has been arranged.

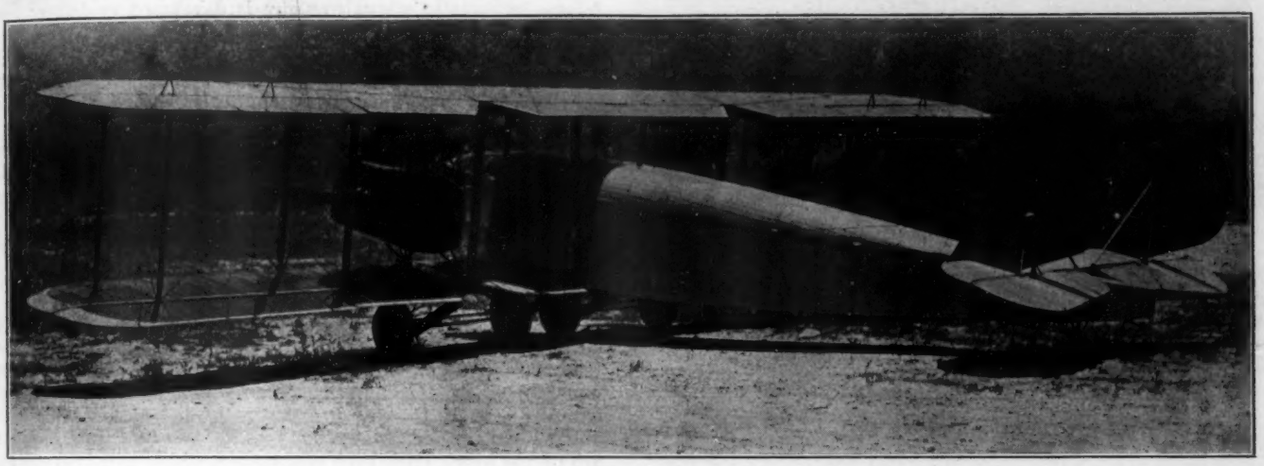
MAKE AND TYPE	Kind of aircraft	ENGINES: Number and type.	Unit Hp.	Total Hp.	Speed, km/hr.	Hours to fly 800 km.	Fuel and oil consumed per hr. (kg.)	Total load—kg.	Kg. fuel for Dm800	Fuel and weight of pilot (75 kg.)	Com. or Mil. load kg.	Index of efficiency.
Caproni Ca 3	Airplane	3 I. F. V. 4b	150	450	142	5.6	112.5	1000	630	705	295	374.6
Caproni Ca 5	"	3 I. F. V. 6	250	750	142	5.6	187.5	1800	1050	1125	675	514.2
Fiat Br.	"	1 Fiat A 14	700	700	253	3.1	175.0	1000	542	617	383	569.0
H. 16. A	Seaplane	2 Liberty	330	660	150	5.3	165.0	1500	874	949	551	504.3
Handley Page W. 8	Airplane	2 Napier Lion	450	900	180	4.4	225.0	1450	900	1065	385	311.1
I. A. M. R. 1 bis	Seaplane	3 I. F. V 6	250	750	160	5.0	187.5	1500	937	1012	488	416.6
Macchi M. 12	"	1 Ansaldo 4 E	450	450	180	4.4	112.5	810	495	570	240	387.8
Savoia S. 12	"	1 Ansaldo 4 E	450	450	214	3.7	112.5	800	416	491	309	594.2

The Barnhart Twin I5 "Wampus-Kat"

The development in American, moderate sized, commercial transport airplanes is shown in the Barnhart Twin 15 "Wampus-Kat", a new product of the C. R. Little aircraft Works of Pasadena, California.

Before the work of designing and constructing the machine was started, one year was spent in planning and investigating the need for a commercial airplane, which would assist in establishing the commercial use of aircraft. Mr. G. Edw. Barnhart conducted this investigation and as a result incorporated into the design of B.T.15 "Wampus-Kat" the features which would satisfy the needs of commercial aviation. Mr. L. G. Stern is the shop superintendent and personally supervised the construction of the "Wampus-Kat". The establishment and construction of the B.T.15 "Wampus-Kat" was financed by Mr. C. R. Little, a retired business man, who has faith in the future of commercial aviation. Mr. Murray S. Elton is carrying on the expansion of the organization, sales and works.

The unique christening of this new machine was held August 3, 1921, under the auspices of the Pasadena Chamber of Commerce with the Tournament of Roses Association cooperating.



THREE-QUARTER REAR VIEW OF THE BARNHART "WAMPUS- KAT"

Wing Structure

There are seven wing panels; a top center section which extends from the right engine mounting to the left engine mounting; two lower sections which run from fuselage to engine mounting. The upper and lower outer panels are of same size and shape.

Four ailerons are used and are of ample size to give control at the stalling speed. All aileron control wires are external so that they may be inspected. The machine has no stagger or dihedral. The wing curve is R.A.F. No. 6 A. The struts form a three bay system with lift wires double and landing wires single. Between the fuselage and engines all wires are duplicated. The wing spars are of hollow box girder construction with block internal and external strut points. The blocks are all properly tapered so as to allow the bending stress being brought in gradually to the strut points. The ribs are spruce webs with lightening holes and reinforcement for horizontal shear. The attachment to the spare is done by U shear blocks which insures the ribs and relieves the cap strips of this vertical shear load. The cap strips are spruce with a groove for the ribs. All internal and external fittings are mild steel of clean cut simple design for ease of production. The wings are internally braced with double steel wires and adjustable turnbuckles. All external strut fitting bolts straddle the spar and are retained from sliding by special blocks and bolts through the neutral axis of the spar which gives the fittings a permanent tie. Where the wings join the fuselage, or each other, there are pin joints parallel to the neutral axis of the spars. The panels are covered with grade A linen sewed to the ribs and in accordance with government practice six coats of dope and three coats of Cosmolac varnish are used.

The wings are of the folding type and to do this requires little or no time and is accomplished by pulling four lock pins and four master pins. Dummy or auxiliary struts are provided which properly space the upper and lower planes in relation to their fittings. There are also provided the spacer bars which tie the wings to the fuselage at the rear outer.

In testing, the machine has been towed over very rough ground at 30 m.p.h. with the wings folded and there was no shake to the wings nor was any alignment or tightening of wires required. In trucking a machine to the field, in the customary manner, the machine must be entirely dismantled, and then set up at the field. This machine has been towed through streets and traffic with the wings folded back. After arriving at the field the machine only required a matter of minutes to make ready for flight. The hinge on which the wings turn is a universal joint so that there can be no over loading of it due to any angularity of the wings or deflection of the spars. With the wings folded the engines can be worked on with ease and there is no danger of tools being laid on, or dropped through, the wings.

Fuselage

The main load carrying structure of the fuselage is of streamline form and the cabin is constructed so as to give the greatest strength for the least weight, and so that repairs or adjustments may be made readily. This structure has four ash longitudinal members and spruce struts for lateral and vertical members. The structure is trussed with steel wire and adjustable turnbuckles. The floor and dome of the pilot's and passengers' cabin is of mahogany three-ply wood with natural finish. The four seats in the passenger cabin are readily removable which allows the number of people or goods to be carried to be arranged for any suitable manner of load. There is ample room behind the rear seats for luggage. Ventilation doors are provided in the dome in addition to a large sized door. Two windows are provided for each passenger and a large negative observation lens is in the floor ahead of the passengers. This lens is in convenient position for all passengers to view the ground. Ample room is provided as the floor space is 6 ft. x 3 ft. 8 in.

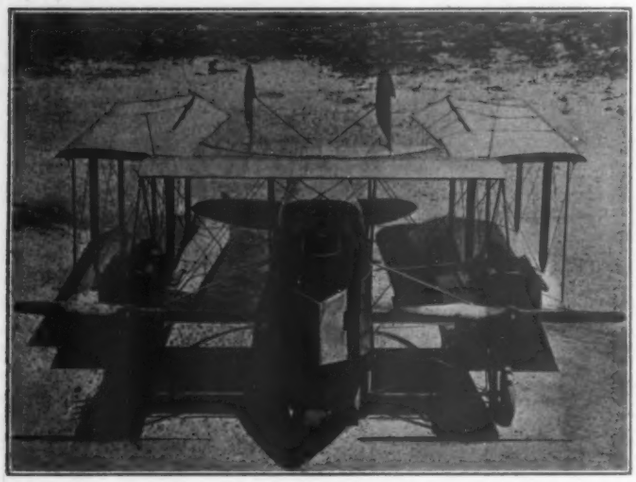
All control wires and attachments are protected against clothing or jamming by passengers or goods. The cabin walls and cushions are dark grey Fabricoid. The entrance to the pilots and passengers cabin is through the floor in the nose of the machine. The pilot's cabin is in the nose in front of

the passengers. For vision the pilot has three side windows, one floor window, and in addition can see through the dome. With this arrangement he can watch the engines as well as view the ground and horizon.

The cabin is clean for there is no oil, gasoline, or carbon monoxide as is in most cases true of single engined machines. Dress clothes can be worn with perfect convenience for no helmet or goggles are needed by the passengers.

The outside of the entire fuselage except the cabin dome is linen covered. The fabric is laced to the longerons and struts. The fabric is laced on three sides of the fuselage namely bottom and sides, with a detachable streamline cover for the top rear of the fuselage.

The fuselage is large enough for a man to work inside in making any adjustment. With the laced fabric and breaker strips he can open any portion which might require repairs.



THE BARNHART "WAMPUS-KAT" WITH THE WINGS FOLDED AGAINST THE FUSELAGE

The design of the fuselage is such that consistent and uniform strength is maintained throughout and repairs can be easily and quickly made.

Controls

Special "Dep" control is provided for elevators, ailerons and rudders. A hand throttle is provided by which one or both engines can be opened or closed. Spark retards extend into the cabin. The ignition switches are within easy reach as are all other controls. The instrument board is composed of one instrument of each of the following for each engine; tachometer, oil pressure gauge, and thermometer. There are also a clock compensated for altitude, and an altimeter.

Landing Gear

The landing gear is of rugged construction of the four wheel type. The use of the four wheels allows the machine to ride smoothly over the worst of rough ground and also has the feature of allowing two tires to be blown off without danger in landing.

The construction is of wood and steel. The four main vertical and diagonal bow struts are nine lamination ash. The front and rear struts are a continuous loop to allow no digging into the ground of the strut ends and to allow a smooth place on which to wrap the shock-absorber. The bow struts of ash are 2⅛ x 2 in. and are streamlined with a hollow spruce fairing. The entire strut assembly is wrapped with linen treated with dope and natural varnished surface.

Steel spools with the side thrust and ground friction arms are used on which to wrap the rubber exerciser cord. There are reach wires which allow the rubbers to absorb six times the weight of the machine. Any additional load in landing is transmitted direct to the struts through reach cables. Spreader tubes of steel extend between each pair of front struts. The bracing is by double steel cable in the plane of the front struts and single steel cable in the plane of the rear diagonal struts.

Engine Mounting

The engines are mounted on steel tubing beds with wood vibration breakers. The bracing is of V type and all ends are pin-jointed. In this assembly by removing six main pins the cowling, radiator and engine can be removed as a complete unit. This would mean a great saving in time in the operation of an air line. The cowling, radiator, in fact all, could be assembled before setting in the machine thereby not keeping the machine out of operation as long as by dismantling each component part of the power plant. The main engine bolts do not pierce the tubing bed but are rings with studs. The radiator is supported by a felt pad and is tied from the top to keep out fore and aft movement.

As a fire preventative all structural members are of steel with only a wood vibration strip.

Fuel System

To protect against fire the main gasoline tank is below the fuselage. This allows any leakage to drip in free air. From the main tank the gasoline is delivered to two centrifugal pumps by gravity where pressure is developed to deliver the gas to the main control box in the fuselage and then to the desired gravity gasoline tank. Through the use of the central control box gasoline can be delivered at any pressure or by gravity. The gasoline system for each engine is entirely separate.

In long cross country flights gasoline can be stored in the fuselage in five gallon cans and poured into the main tank through the main tank filler while in the air. In ordinary filling the gasoline is poured into the tank from out side the body. All pipe line connections are of the olive and special fabric lined moulded rubber hose connections.

Cowling

The cowling is so arranged that by closing the rear fire door or shutter, it is possible to use any of the gases or liquids for extinguishing any fire. The entire cowling is of aluminum and is in five removable sections so as to allow for working around any particular part of the engine with ease and without removing any but the one section. The sections are of the hinge joint type connections which will take up all wear and not allow the cowl to become loosened.

Report of the Test Pilot

The performance of the ship shown in the test work done so far is remarkable. The engines both turn the same r.p.m. but are about 100 r.p.m. under normal, this would indicate the propellers were not proper for the engines. It will be within reason to expect an increase in performance.

"The Dep" is very efficient. The control ratio seems to be correct, and very little movement on the wheel is necessary. The ship has at least 50 per cent more aileron than even an exceptional condition would call for. This control is very natural, both in movement and in results.

The elevator control is sufficient for all speeds, but does not have so much surplus control as the ailerons. The action on the machine is slower than the aileron action. One unaccustomed to the machine would have the impression that the elevators are too slow in action. However, it is but natural to assume that a long fuselage machine would be slower on the elevators than one with a short fuselage. Then too, a cargo or passenger machine should have all the smoothness in operation possible, and avoid all quick and violent pitches of the machine. The machine is so stable that the elevator control is sufficient, with reasonable over-amount. The only benefit in making it faster would be to be more nearly like the average ship in the control.

The rudders are sufficient with enough surplus control when but one engine is running. When both engines are running very little rudder is needed. The ratio can be varied very easily to satisfy conditions.

All instruments are in full view of the pilot and mounted so as to be easily readable.

The machine is easy to fly, take-off and land. It flies naturally and is stable. But little control is necessary at any time, even in rough air. It makes natural turns to either the right or left, and makes them equally well flying level or in a climb. When stalled the machine settles slowly with no tendency to spin or fall violently and recovers quickly.

The horizontal balance is the same whether loaded or empty, flying level or gliding. The addition of load does not change the climb to any great extent. The glide is good with plenty of speed at small gliding angles. The general controllability under all conditions is excellent.

When one engine is shut off, the machine does not swing abruptly, but turns toward the dead engine very slowly. There is ample time to stop all turn with the rudder. This is a very great point in favor of the machine.

The machine flies level on one engine at 2,400 ft. with 90 gal. of gasoline and one passenger, and at 1,500 ft. with the same gasoline load and two passengers. It requires about 2 in. of down aileron and roughly 2/3 in. of the total rudder. It can be turned to either direction.

Specifications

High speed at sea-level	85-90	m.p.h.
Low " " "	43-45	m.p.h.
Climb to 3500 ft. with full load in 10 min.		
Ceiling	10,000	ft.
Total horse-power	180	
Total wt. of the machine empty except water	2611	lb.
" " " gasoline and oil for 4½ hr.	540	"
Total " useful load	1404	lb.
" " " pay "	640	"
" " " the machine fully loaded	4015.065	lb.
Wing loading	8.23	"
Power "	22.3	"
Total span wings folded	22	ft.
span over all upper wing	50	"
" " " lower "	50	"
Chord upper wing	5.5	"
" lower "	5.5	"
Gap	6	ft. 8 in.
Stagger	0	
Dihedral	1°	
Overall length	30	ft.10 in.
" height	11	ft. 0 in.
Wing section R.A.F. 6 mod. A		
Area upper wing (excluding ail.)	233.32	Sq. ft.
" lower " " "	210.33	" "
Total area including (4 ailerons)	484.9	" "
Area (2 upper and 2 lower ailerons)	41.25	" "
Area Stabilizer	36.00	" "
Area Elevators (2)	23.00	" "
Area fins (2)	10.30	" "
Area rudders (2)	19.00	" "

The machine has folding wings which will allow it to go into a hangar 22½ ft. x 34 ft. x 11 ft. 6 in.

The seats for the passengers can be removed and will allow a space unrestricted by struts, wires or prejections of 6 ft. x 44 in. x 48 in.

The Air Mail

The Air Mail Service will soon place in operation six remodeled airplanes of the DH type on the transcontinental air mail route between New York and San Francisco. These are army machines and by changing the wing and body capacity they will carry double the amount of mail now carried in the Air Mail Service by this type of machine. Eight hundred pounds of mail or 32,000 letters will be carried on the remodeled machines with the same amount of fuel and the same man power, one pilot.

The first of these remodeled machines was inspected at Bolling Field, Washington, this morning by Postmaster General Hays and his assistants, Work, Shaughnessy and Glover, with other postal officials.

The cost of remodeling these machines is about $3,000 per machine whereas the cost of a new machine is about $15,000.

These machines will be compared on the most difficult part of the transcontinental route, which is over the Rockies, flying along with one of the machines now in use which carries only 400 lb. of mail. It is expected ultimately to use this type of remodeled machine on the entire route which will increase operating capacity 100 per cent.

The remodeled machine is the latest type of ship for mail carrying. The experience of the Post Office Department with a number of different types of machines has resulted in the conclusion that the best type of machine for use in the Air Mail Service is a single-engined machine carrying approximately 800 pounds of mail, or 32,000 letters, with a high speed of 115 m.p.h., landing speed of 50 m.p.h. and a cruising endurance of four hours.

The remodeled machine is en route from New York to San Francisco on its initial trip. It will be sent to the Minnesota State Fair held at the Twin Cities September 3-10, together with Airplane No. 12, which made the initial trip May 15, 1918, when the first air mail route was established between Washington and New York. This old machine has been in service for a period of three years and five months. It is a Curtiss model JN4H with a 150 hp. Hispano-Suiza motor. It has a carrying capacity of 200 lb. of mail or approximately 8,000 letters, with a cruising endurance of three and one-half hours. Its speed is 75 m.p.h. The records show that this old machine has flown over 40,000 miles.

During July of this year the Air Mail Service flew 13,150 miles with mail, carrying 224,000 letters, with a percentage of performance of 100 per cent New York to Chicago; 99 per cent Chicago to Rock Springs, Wyo., and 98 per cent Rock Springs to San Francisco. The mileage for the transcontinental route is 2,630 miles from New York to San Francisco.

During the year ended June 30, 1921, 1,770,658 miles were flown and 44,834,080 pieces of mail were carried, with a percentage of performance for the year of 85.96 per cent. There are 49 pilots, 380 mechanics and 86 planes used on the transcontinental route. There are air stations at New York, N. Y., Bellefonte, Pa., Cleveland, O., Bryan, O., Chicago, Ill., Iowa City, Ia., Omaha, Neb., North Plattee, Neb., Cheyenne, Wyo., Rock Springs, Wyo., Salt Lake, Utah, Elko, Nev., Reno, Nev., and San Francisco, Calif. The Post Office Department is now negotiating at other points for joint Army and Post Office fields.

Maj. Schroeder with Underwriters

R. W. Schroeder, holder of the world's altitude record (33,114) ft.), and until recently Major, U. S. Army Air Service, and Chief Test Pilot, McCook Field, Dayton, O., will join the staff of Underwriters' Laboratories Sept. 1 and will take a principal part in the aircraft and aviator classification work which the Laboratories are doing for the National Aircraft Underwriters Association. Major Schroeder's intimate practical experience will assure for this work the object of the founders of the Laboratories—"to secure the best and fairest opinion regarding the merits or demerits of every device, system, machine or material in respect to life and fire hazards." In addition to Major Schroeder, the aircraft personnel of the Laboratories' staff includes:

S. V. James, Mechanical Engineer, for several years chief designer in an extended airplane experimental research work and C. R. D'Olive, holder of Distinguished Service Cross.

THE AVRO "BABY" OF THE SHACKLETON ANTARCTIC EXPEDITION
Photo Wide World

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

William Battencourt Souza

SOUZA, WILLIAM BATTENCOURT, 1st Lieut. Air Service; born, New Bedford, Mass. March 17, 1896; son of William Souza and Mary (Battencourt) Souza.

Educated: Public schools of New Bedford, Mass.

Aeronautical Activities: Cadet, Aug. 1917 to March 1918; 2nd Lieut. Pilot, March 1918 to July 1920; 1st Lieut. Pilot, July 1920 to date.

Flying Rating: Airplane Pilot.

War Service: 1st Officers' training Camp, May 1917 to Aug. 1917; Air Service, Aug. 1917 to Armistice.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, 41 Page St., New Bedford, Mass.

Oliver P. Gothlin, Jr.

GOTHLIN, OLIVER P., Jr., 1st Lieut., Air Service; born, Dayton, Ohio, Feb. 14, 1894; son of Oliver P. Gothlin and Carrie Bell Gothlin; married, Sarah Elizabeth McCausland, July 3, 1918.

Educated: Public schools, Dayton, Ohio and Columbus, Ohio; Columbus North High School; Ohio State University, 1913-1915; Case School of Applied Science, 1916-1917.

Aeronautical Activities: Ground School, S.M.A., Champaign, Ill., July 22, 1917 to Sept. 22, 1917; cadet, Scott Field, Sept. 22 to Dec. 31, 1917; Post Field, Camp Jackson, Camp Dick, Godman Field, Langley Field, as pilot.

Flying Rating: Airplane Pilot.

War Service: Signal Corps, May 23, to July 22, 1917.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.

Wadsworth Wilbar

WILBAR, WADSWORTH, Advertising; born, Taunton, Mass., Feb. 18, 1894; son of Albert Edwards Wilbar and Hattie (Moore) Wilbar; married, Rachel Forbes, April 20, 1918.

Educated: Public schools of Taunton, Mass.; Amherst College, 1917.

Professional: Manufacturing business; advertising.

Aeronautical Activities: Ground School, M. I. T.; flying training at Naval Air Station, Pensacola, Fla.; flying duty at Montauk, L. I.

Flying Rating: Ensign.

War Service: 1917-1918.

Member: Massachusetts Aero Club.

Present Occupation: Advertising business.

Address: 44 Bromfield St., Boston; home, 142 Middlesex Road, Chestnut Hill, Mass.

Nelson Sawtelle Hopkins

HOPKINS, NELSON SAWTELLE, Manufacturer; born, Williamsville, N. Y., May 1, 1870; son of Timothy Augustus Hopkins and Elvira Marie (Sawtelle) Hopkins.

Educated: Williamsville public schools; Chicago Manual Training School, 1889.

Professional: Designed and built three designs of the earliest motor bicycles, 1894-1895; Consulting and Designing Engineer until 1906; Manager and Treasurer of Wirt Mfg. Co., 1906-1911; Manager, Curtiss Airplane Co. of Canada and Curtiss Airplane and Motor Corp., Buffalo, N. Y., 1916; Phoenix Aircraft Products Co., Williamsville, N. Y.

Aeronautical Activities: Organized the factory and manager of the Curtiss Airplane and Motor Ltd., Toronto, Canada, building JN planes for British Admiralty and all ailerons for all Curtiss airplanes made in the U. S. and shipped to Europe, 1915; built model C or Canada, first large successful twin engine land-plane, 1915; directed development of nitrate and acetate dopes for Curtiss Co. in 1915 and started development of Fireproof dopes and doping methods for aircraft; developed fireproof paint for aircraft woodwork, waterproofed and fireproofed cloths and special fireproof dope for "lighter-than-air" craft.

Member: Aero Club of America.

Present Occupation: President, Phoenix Aircraft Products Co.

Address: Williamsville, N. Y.

Arthur E. Easterbrook

EASTERBROOK, ARTHUR E., Captain, Air Service; born, Amsterdam, N. Y., Nov. 4, 1893; son of Edmund B. Easterbrook and Fannie Easterbrook; married, Gertrude L. Augustine, May 1, 1920.

Educated: Port Townsend High School; three years, University of Washington.

Aeronautical Activities: Aerial School for Observers, Fort Sill, 1918; 9th Squadron, R. A. F.; First Aero Squadron, July 1918 to June 1919; 12th Aero Squadron, Oct.-Dec. 1919; First Surveillance Group, 1920; Office of 8th Corps Area Air Service, April 1920 to Nov. 1920; Student, Field Officers' School to present date.

Flying Rating: Aerial Observer, March 1918; Reserve Military Aviator, May 1919; Airplane Pilot, Feb. 1920.

War Honors: Distinguished Service Cross, Oct. 3, 1918; Oak Leaf Cluster to be worn with D. S. C., Jan. 15, 1919; Croix de Guerre, April 22, 1919.

Member: Hon. member, Aerial Club of the Northwest.

Present Occupation: Captain, Air Service.

Address: Langley Field, Va.

S. L. Van Meter, Jr.

VAN METER, S. L., Jr., 1st Lieut., Air Service; born, Fayette County, Ky., April 8, 1888; son of Solomon Lee Van Meter and Evelyn Trent (Swoope) Van Meter.

Educated: Kentucky University; Oxford University.

Aeronautical Activities: Experimental Section, Engineering Department, Kelly Field to Sept. 21, 1918; parachute experimental work at Wilbur Wright and McCook Fields until Jan. 1919; Engineer Officer, Kelly Field from July 1919 to May 1921; inventor of parachute pack and parachute release for airplane.

Flying Rating: Reserve Military Aviator; Airplane Pilot.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.; home, Lexington, Ky.

Euclid Dennis Miller

MILLER, EUCLID DENNIS, Oceanic Cables; born, Rock Island, Tenn., Nov. 1, 1885; son of William V. D. Miller and Emma (Dunlap) Miller; married, Wanda McCauley, Nov. 4, 1919.

Educated: Public schools, McMinnville, Tenn.; 4 years, Burritt College.

Professional: Newspaper reporter, editor and publisher, 1912-1916; army, 1917-1919; 1919 to date, with Cuban-American Telephone Co., Havana, Cuba.

Aeronautical Activities: May 1918 to July, Post Field; observers school at Selfridge Field, July-Sept., 1918; Oct.-Nov. 1918, at the observers school, Tours, France.

Flying Rating: Aerial Observer, Sept. 1918.

Member: American Legion.

Present Occupation: Maintenance of communication over Havana-Key West cables.

Address: Box 945, Cuban-American Telephone and Telegraph Co., Havana, Cuba; home, Rock Island, Tenn.

Isaiah Davies

DAVIES, ISAIAH, 1st Lieut., Air Service; born, Baxter Springs, Kans., July 12, 1890; son of William B. Davies and Mollie Davies; married, Beatrice M. Whitaker, June 2, 1915.

Educated: Grammar school and high school of Cherokee Co., Kans.; Business College, 1911.

Professional: Professor in business college, 1911-1912; U. S. Army since 1912.

Aeronautical Activities: Aviation Section, Signal Corps, 1914 to Dec. 1917; 1st Lieut. and Capt., Air Service, Dec. 1917 to July 1920; 1st Lieut., Air Service, Regular Army, July 1920 to date.

Flying Rating: Reserve Military Aviator; Airplane Pilot.

War Service: Air Service, April 6, 1917 to Nov. 11, 1918.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.

Delbert Emerick Jones

JONES, DELBERT EMERICK, 1st Lieut., Air Service; born, Boise, Idaho, Jan. 26, 1897; son of William Jones and Jennie G. Jones.

Educated: Public schools of Boise, Idaho, Stanton, Va., Medford, Ore., and Seattle, Wash.; Medford High School, Medford, Ore.

Aeronautical Activities: 1917, enlisted in Aviation Section Signal Corps at Vancouver, Wash.; at Rockwell Field until Sept. 10, 1917; Ground School, University of California, Nov. 29, 1917; reported back at Rockwell Field; completed flying training and was commissioned, Jan. 28, 1918; to France, Feb. 16, 1918.

Flying Rating: Reserve Military Aviator, Jan. 28, 1918; Airplane Pilot, Nov. 1920.

War Service: Thirteen months overseas with the 89th Aero Squadron.

Present Occupation: 1st Lieut., Air Service.

Address: 305 West Bannock St., Boise, Idaho.

William Carlton Williams, Jr.

WILLIAMS, WILLIAM CARLTON, Jr., Automobile Business; born, Atlantic, Iowa, June 27, 1891; son of William Carlton Williams, Sr. and Hannah Milward (Turner) Williams; married, Mildrede Louise Appleman, Nov. 15, 1918.

Educated: Atlantic grade and high schools; Iowa State College.

Professional: Manager, Flying Herring Motor Co.; automobile business.

Aeronautical Activities: Ground school, University of Illinois; Camp Dick; Kelly Field; Call Field; Post Field.

Flying Rating: Reserve Military Aviator.

War Service: Aug. 1917 to March 1920.

Member: Aero Club of Iowa; Aero Club of America.

Present Occupation: Garage owner.

Address: Coon Rapids; home, Menlo, Iowa.

Edward Higley Guilford

GUILFORD, EDWARD HIGLEY, 1st Liust., Air Service; born, Emmetsburg, Iowa, July 31, 1889; son of William E. Guilford and Edith M. Guilford.

Educated: Electrical Engineering, Mass. Inst. of Tech.

Aeronautical Activities: Air Service, U. S. Army from May 1919 to date.

Flying Rating: Airplane Pilot.

War Service: Radio Officer, Signal Corps, Nov. 1917; Communications Officer, Air Service, July 1918; Brigade Communications Officer, Air Service, April 1921.

Member: Aero Club of America; Institute of Radio Engineers.

Present Occupation: Brigade Communications Officer, Air Service, U. S. A.

Address: Langley Field, Va.

Robert J. Stewart

STEWART, ROBERT J., President of American Aircraft, Inc.; born, April 2, 1892; son of Robert Stewart and Florence Stewart.

Educated: Baltimore Polytechnic Institute.

Professional: 1913-1914, Electrical and Mechanical Engineer, designing of gasoline motors and electrical accessories; 1914-1919, Loane Engineering Co.; Superintendent of the American Propeller & Mfg. Co., manufacturers of the Paragon Aeronautical Propeller; 1920, practiced Mechanical Engineering.

Aeronautical Activities: 1914-1919, Superintendent of American Propeller & Mfg. Co.; 1915, associated with F. G. Ericson and the Jannus Bros., receiving instruction on flying boats; 1915, built two successful models of flying boats, single and twin engined; 1916, in military service at Mexican Border; 1916-1919, engaged in design and production of aeronautical war supplies; 1921, organized first active aeroplane manufacturing, distributing and operative company in the state of Maryland.

Member: American Flying Club of Baltimore; Engineers Club.

Present Occupation: President, American Aircraft, Inc.

Address: 3719 North Road, Baltimore, Md.

Stanley Thompson Curran

CURRAN, STANLEY THOMPSON, Telephone Engineer; born, New York City, April 21, 1894; son of Charles C. Curran and Grace W. Curran; married, Helen L. Guyette, June 5, 1920.
Educated: E. C. Grammar and high schools; Cornell University.
Professional: Army Ordinance Department as Mechanical Engineer; Western Electric Co., Engineering Department, Jan. 1920 to date.
Aeronautical Activities: U. S. Naval Aviation, Sept. 1917 to March 1919; stationed at Pensacola, Fla., Hampton Roads, Va., Fort Worth, Tex., and Killingholme, England.
Flying Rating: Naval Aviator No. 287, Jan. 1918.
War Service: Navy, April 1917 to March 1919.
Present Occupation: Telephone Engineer, Western Eelectric Co.
Address: 463 West St.; home, 39 West 67th St., New York, N. Y.

Roland Rohlfs

ROHLFS, ROLAND, Airplane Pilot; born, Buffalo, N. Y., Feb. 10, 1892; son of Charles Rohlfs and Anna Katherine (Green) Rohlfs; married, Alta Helen Pearce, June 3, 1916.
Educated: Public schools of Buffalo; Nichols private school; Lafayette High School; Technical High School.
Professional: Experimental aviation test pilot.
Aeronautical Activities: Taught to fly by Victor Carlsrom; instructor two years; in charge Buffalo Curtiss Field, one year; experimental test pilot, four years; holds seaplane speed record; holds climbing record of 20,000 feet in ten minutes made eight altitude flights several about equalling world's record; American entrant Gordon Bennett Race 1920.
Present Occupation: George Ortendorf Motor Corp.
Address: 1221 Main St.; home, 156 Park St., Buffalo, N. Y.

Rufus Benjamin Davidson

DAVIDSON, RUFUS BENJAMIN, 1st Lieut., Air Service; born, Shady Dale, Ga., Oct. 19, 1893; son of Benjamin M. Davidson and Lillian E. Davidson.
Educated: Shady Dale High School; University of Georgia.
Professional: 1912-1915, Teacher; 1916-1917, telephone construction clerk.
Aeronautical Activities: Training at various fields; attached to 20th Squadron since 1919.
Flying Rating: Reserve Military Aviator, Sept. 11, 1918; Airplane Pilot.
War Service: Army Air Service, March 9, 1918 to present date.
Member: Aero Club of America.
Present Occupation: 1st Lieut., Air Service.
Address: Langley Field, Va.

Richard Maybeck Beil

BEIL, RICHARD MAYBECK, Advertising; born, Chicago, Ill., July 1, 1898; son of Carl F. Beil and Irene (Maybeck) Beil.
Educated: Morgan Park Military Academy; Chemical Engineering, Armour Institute of Technology.
Professional: Advertising; motion picture photography.
Aeronautical Activities: Worked with E. K. Jaquith during summer of 1920; on flying duty in the Air Service.
Flying Rating: Reserve Military Aviator.
War Service: U. S. Air Service, Oct. 1917 to Dec. 1918.
Member: Aviation Club of Chicago; Aero Club of Illinois; Aero Club of America.
Present Occupation: Advertising.
Address: 1445 Argyle Ave., Chicago, Ill.

Erik Henning Nelson

NELSON, ERIK HENNING, 1st Lieut., Air Service; born, Stockholm, Sweden, June 18, 1888; son of Erik E. Nelson and Christina (Ahler) Nelson.
Educated: High school and technical school of Stockholm, Sweden.
Professional: Automobile business, 1909 to 1915.
Aeronautical Activities: 1916-1917 Experimental Dept., Curtiss Co.; Transoceanic Co., July to Oct. 1917.
War Service: Army Air Service, Oct. 1917 to date.
Member: Aero Club of America; Expert License, Aero Club of America.
Present Occupation: 1st Lieut., Air Service.
Address: Aero Club of America, 11 East 38th St., New York City.

Henry Pascale

PASCALE, HENRY, Captain, Air Service; born, Omaha, Nebr., March 7, 1894; son of Vito Pascale and Ida Pascale.
Educated: Public and high schools of Omaha, Nebr.; A.B. 1916, University of Nebraska.
Professional: Student until May 1917 when ordered to First Training Camp, Fort Snelling, Minn.
Aeronautical Activities: Training at various fields; Aerial Photography along the Southern Border.
Flying Rating: Airplane Pilot, July 1918.
War Service: Army, May 1917 to March 1918.
Present Occupation: Captain, Air Service.
Address: Langley Field, Va.; home, 4021 Cuming St., Omaha, Nebr.

William S. Hance, Jr.

HANCE, WILLIAM S., JR., Publishing Business; born, Baltimore, Md., Feb. 27, 1896; son of William S. Hance, Sr. and Viola K. (Eacritt) Hance; married, Margaret Bertha Bryce, Jan. 19, 1918.
Educated: George Washington University.
Professional: Journalism and scientific work.
Aeronautical Activities: Enlisted A.S.E.R.C., Nov. 1917; graduated from Princeton Ground School and sent to Camp Dick, Ellington Field, and San Leon, Tex. where received flying instruction; full gunnery and bombing course and was designated as Night Bombing Aviator; commissioned in Reserves, Dec. 1918.
Flying Rating: Bombing Aviator, certificate 2190.
War Service: As above.
Present Occupation: Yearbook Publishing Co.
Address: Clifton Terrace Apts., Washington, D. C.

Charles Heidt

HEIDT, CHARLES, Stationer; born, New York, N. Y., Aug. 9, 1894; son of Joseph Heidt and Anna Heidt.
Educated: Morris High School; C.E. 1915, Cornell University.
Professional: Civil Engineer, Public Service Comm. of New York, 1915-1916; Civil Engineer, New York Central R. R., 1916-1920; stationery business, 1921.
Aeronautical Activities: Flying Cadet, Princeton, Dallas, San Diego, Riverside, 1918-1919; completed primary and advanced pursuit flying, including aerial gunnery, combat, etc.
Flying Rating: Reserve Military Aviator.
War Service: Army, Nov. 1917 to Jan. 1919.
Present Occupation: Stationery business.
Address: 799 Broadway; home 973 Whitlock Ave., New York, N. Y.

Claude Hamilton Smith

SMITH, CLAUDE HAMILTON, Paper Manufacturer; born, Holyoke, Mass., Dec. 4, 1894; son of George H. Smith and Ethelyn J. (Hamilton) Smith.
Educated: Highland Grammar and High School of Holyoke, Mass.; Willistan Seminary, 1912-1913; 1915-1916, University of Michigan; 1916-1917, Colorado School of Mines.
Professional: Paper manufacturing.
Aeronautical Activities: Airplane mechanic, Rockwell Field; Ground School, Berkeley, Calif.; flying training for six months at Mather and March Fields.
Flying Rating: Reserve Military Aviator.
War Service: June 1917 to March 1919.
Member: Aero Club of Massachusetts.
Present Occupation: Paper manufacturer.
Address: Crocker McElwain Co.; home, Phoenix Chambers, Holyoke, Mass.

Harlan Lester Heward

HEWARD, HARLAN LESTER, Attorney; born, Gem, Idaho, May 26, 1892; son of John H. Heward and Theresa (Nordquist) Heward.
Educated: Public schools of Helena, Mont., Santa Monica, Calif., Mullan, Idaho; A.B. 1913, University of California.
Professional: Admitted to Bar in Nevada, 1914; practiced law at Wallan, Idaho, Reno, Nev., 1916 to date; member of Nevada Legislation, 1921.
Aeronautical Activities: Training at Post Field, Camp Dick, Selfridge Field, Hazelhurst Field, and Brindley Field.
Flying Rating: Reserve Military Aviator.
War Service: Infantry, Aug. 1917 to March 1918; Air Service, March 1918 to Jan. 1919.
Present Occupation: Attorney.
Address: 15 W. Taylor St., Reno, Nev.

Ladislas d'Orcy

D'ORCY, LADISLAS, Aeronautical writer; born, Fiume, Free State of Fiume, March 27, 1888; son of Emile and Charlotte d'Orcy.
Educated: High School, Fiume; course in aeronautical engineering, Sorbonne, Paris.
Professional: Connected with aeronautical publications since 1911.
Aeronautical Activities: Contributing editor, *Aircraft* (New York), 1911-12; *Aero and Hydro* (Chicago), 1912-14; *L'Aero* (Paris), 1912-14; *Aerial Age*, Flying, 1915-16; associate editor, *Aviation and Aeronautical Engineering*, 1917-19; editor, *Aircraft Journal*, 1918-20; editor, AVIATION AND AIRCRAFT JOURNAL, 1920 to date. Correspondent, All the World's Aircraft. Chief of Albany control station, New York-Toronto Airplane Race, 1919; chief of Lufbery Field control station, Pulitzer Trophy Race, 1920.
War Service: Volunteer, Foreign Legion of France, 1914. Honorably discharged for physical disability.
Books: "D'Orcy's Airship Manual", New York, 1917.
Member: Aero Club of America; Society of Automotive Engineers; Ligue Aeronautique de France.
Present Occupation: Editor, AVIATION AND AIRCRAFT JOURNAL.
Address: 225 Fourth Ave., New York; home, 5 Sheridan Sq., New York.

Godfrey De Courcelles Chevalier

CHEVALIER, GODFREY DE COURCELLES, Lt. Comdr., U. S. Navy; born, Providence, R. I., March 7, 1889; son of Charles N. Chevalier and Elizabeth Ada (Waterhouse) Chevalier; married, Marguerite Jackson, June 14, 1919.
Educated: Public schools of Odgensburg, N. Y. and Medford, Mass.; U. S. Naval Academy.
Aeronautical Activities: Assigned to aviation duty, 1912; continued this duty to date.
Flying Rating: Aero Club Hydroaeroplane Certificate No. 5; Naval Avitor No. 7; Aero Club Expert No. 35; French Brevet.
War Service: Eighteen months foreign service during war in France and England.
War Honors: Croix de Guerre; Legion of Honor; U. S. Navy Distinguished Service Medal.
Member: Army and Navy Club; New York Yacht Club.
Present Occupation: Lt. Comdr., U. S. Navy.
Address: U.S.S. Langley, Navy Yard, Norfolk, Va.; home, 33 Summit Road, Medford, Mass.

Samuel Stewart Bradley

BRADLEY, SAMUEL STEWART, Aeronautical Industry; born, Medina, Ohio, June 27, 1869; son of John Albro Bradley and Eleanor Todd (Stewart) Bradley; married, Genevieve Cornwell, Dec. 14, 1901.
Educated: Medina High School; Ann Arbor High School; University of Michigan.
Professional: Civil Engineering, 1891; manufacturing and industrial, 1897; merchandising and manufacturing, 1911; Brooklyn Park Department, 1917; Manufacturers Aircraft Association to date.
Aeronautical Activities: General Manager, Manufacturers Aircraft Association; member, American Aviation Mission (European Investigation, 1919); member following sub-committees of National Advisory Committee for Aeronautics: Landing Fields, International Air Navigation; member, sub-committee on commercial aviation of economic liaison committee; member, sectional committee for aeronautical safety code, of the American Engineering Standards Committee; Secretary, special civilian committee on aerial law.
Member: Aero Club of America; Society of Automotive Engineers
Present Occupation: General Manager, Manufacturers Aircraft Association.
Address: 501 Fifth Ave.; home, 103 East 29th Street, New York City.

Charles W. McClellan

McCLELLAN, CHARLES W., Manufacturer; born, Fall River, Mass., July 1, 1896; son of Charles P. McClellan and Teresa K. (Gilday) McClellan.
Educated: Borden Grammar School; Westall Grammar School; B.M.C. Durfee High School; Brown 1914; Lowell Textile Institute, 1915-1917; B. Textile Chemistry and Dyeing.
Professional: Manufacturer of Marine Equipment.
Aeronautical Activities: U. S. Military School of Aeronautics, Cornell University; Camp Dick; Love Field.
Flying Rating: Reserve Military Aviator.
War Service: Army, July 1917 to Jan. 1918.
Member: Massachusetts Aero Club.
Present Occupation: Manufacturing.
Address: 22 Boomer St.; home, 928 Rock St., Fall River, Mass.

Halsey L. Bingham

BINGHAM, HALSEY L., 1st Lieut., Air Service; born, Peoria, Ill., Nov. 25, 1890; son of William S. Bingham and Ida (Halsey) Bingham.
Educated: Bellflower High School; LL.B., Illinois Wesleyan University.
Professional: Two years prior to service, Attorney at Law.
Aeronautical Activities: Instructor at Rockwell Field during period of war; Nov. 1920, stationed at Langley Field Photographic School.
Present Occupation: 1st Lieut., Air Service.
Address: Langley Field, Va.

William Fitzhugh Buckner, Jr.

BUCKNER, WILLIAM FITZHUGH, Jr., Merchant; born, Marshall, Mo., Oct. 26, 1888; son of Charles Madison Buckner and Daisy (Potter) Buckner.
Educated: Marshall High School; A.B. 1910, University of Missouri.
Professional: Merchant and traveling salesman, 1910-192).
War Service: A.E.F. Supply Officer, 1st Corps Observation Training Center; Supply Officer, Day Bombardment Group, First Army A. E.F.
Present Occupation: Merchant.
Address: Slater, Mo.

Sylvester Lawrence Wheeler

WHEELER, SYLVESTER LAWRENCE, Patent Attorney; born, Milwaukee, Wis., July 30, 1895; son of Leverett C. Wheeler and Adele (Graves) Wheeler.
Educated: Public schools; B.A. 1917, University of Wisconsin; LL.B. 1920, University of Wisconsin Law School.
Professional: Admitted to Bar, Feb. 1921; associated with Erwin, Wheeler and Woolard, Patent Attorneys.
Aeronautical Activities: Training at Gerstner Field; Pilot Instructor in Aerial Gunnery at Carlstrom and Dorr Fields.
Flying Rating: Reserve Military Aviator.
War Service: Signal Corps, U.S.A. Aviation Section, Nov. 1917 to Dec. 1918.
Present Occupation: Patent Attorney.
Address: 204 Grand Ave., Milwaukee, Wis.; home, 59 Watson Ave., Wauwatosa, Wis.

Thomas James Hanley Jr.

HANLEY, THOMAS JAMES, Jr., Major, Air Service; born, Coshocton, Ohio, March 29, 1893; son of Thomas J. Hanley, Sr. and Mary (O'Connor) Hanley; married, Cecelia Meilleut, June 12, 1917.
Educated: Public and high schools of Coshocton; Sacred Heart Porochial School; U. S. Military Academy.
Professional: Commissioned 2nd Lieut., 23rd Infantry until assigned to Aviation Section.
Aeronautical Activities: Student Officer, San Diego 1916; 1st Aero Squadron, Columbus, N. Mex., April 1917; assisted in the organization of Kelly Field No. 1; Officer in Charge Flying, Chanute Field, 1917; Commanded Carruthers Field, 1918-1920; Field Executive Officer, Langley Field.
Flying Rating: Junior Military Aviator, April 1917; Military Aviator, 1920; Airplane Pilot, 1923.
War Service: As above.
Member: Aero Club of America.
Present Occupation: Instructor, Field Officers School, Air Service.
Address: Langley Field, Va.; home, 803 Chestnut St., Coshocton, Ohio.

Davenport Johnson

JOHNSON, DAVENPORT, Major, Air Service; born, Tyler, Tex., March 28, 1890; son of Thomas A. Johnson and Amanda (Davenport) Johnson; married, Marion Craig, March 26, 1919.
Educated: Public schools of Tyler, Tex.; U. S. Military Academy, 1912.
Professional: Student until June 1912; 2nd Lieut., 19th Infantry; 1st Lieut., Infantry, July 1, 1916; Capt.., Infantry, May 15, 1917; Maj. Infantry, July 1918; Lt. Col., Air Service, Aug. 1918.
Aeronautical Activities: Student, Feb. 1916 to Oct. 1916; Pilot's License, Aero Club of France, May 1917; graduate, A.S.S.C., San Diego, Calif.; C.O. 95th Squadron; C.O. 2nd Pursuit Group.
Flying Rating: Junior Military Aviator, Oct. 1916; Military Aviator, Oct. 1919; Pilot's License, Aero Club of America and Aero Club of France; Pilote Aviateur, France.
War Service: U. S. Army, April 6, 1917 to Nov. 11, 1918.
War Honors: French Croix de Guerre.
Member: Aero Club of America; Aero Club of France.
Present Occupation: Major, Air Service.
Address: Langley Field, Va.; home, Tyler, Tex.

William B. Thorne

THORNE, WILLIAM B., Teacher; born, Dell Rapids, Dakota Territory, Jan. 27, 1889; son of Albion Thorne and Clara M. (Bolster) Thorne.
Educated: Sioux Falls and Hartford, S. D. public schools; A.B. 1916, University of South Dakota.
Professional: High school teacher.
Aeronautical Activities: Exhibition and passenger carrying during summer of 1920.
Flying Rating: Reserve Military Aviator.
War Service: U. S. Air Service from April 1918 to Jan. 1919.
Present Occupation: Teacher.
Address: Brown's Valley, Minn.

Paul Linwood Smith

SMITH, PAUL LINWOOD, Newspaper Reporter; born, New York City, June 29, 1897; son of George R. Smith, M.D. and Mabel (Paul) Smith.
Educated: Grammar and high schools, Woonsocket, R. I.; University of Vermont.
Aeronautical Activities: Princeton S.M.A.; Camp Dick; Carruthers Field.
Flying Rating: Reserve Military Aviator.
Present Occupation: Reporter on "Woonscoket Call".
Address: 75 Main Street; home, Greenville Road, Woonsocket, R. I.

Adolf Drey

DREY, ADOLF, Advertising; born, St. Louis, Mo., June 10, 1896; son of Adolf Drey and L. H. Drey.
Educated: Public schools of St. Louis, Los Angeles and New York; A.B. 1917, Washington University.
Professional: Assistant Secretary and Advertising Manager, Wolff-Berger Company, St. Louis, Mo.; Eastern Manager, Illustrated World of Chicago.
Aeronautical Activities: School of Aeronautics, Champaign, Ill.; School of Aeronautics, Oxford, England.
Flying Rating: Qualified Reserve Military Aviator; passed Junior Military Aviator tests.
War Service: Attached to Royal Air Force (British), Oct. 1917 to Jan. 1919, (flying); member of A.E.F., Oct. 1917 to Jan. 1919.
Present Occupation: Advertising Manager.
Address: 120 Fifth Avenue; home, 95 Hamilton avenue, New Rochelle, N. Y.

George Haven Durar

DURAR, GEORGE HAVEN, Lithographing; born; Dripping Springs, Tex., Oct. 20, 1888; son of Harold Cantelo Durar and Madeline Huston (Woodward) Durar.
Educated: 1909, Plainfield high school; New York University.
Professional: Western Electric Co., U. S. Steel Corp.;Trade Lithograph Co.
Aeronautical Activities: Dec. 1916, Kelly Field, R.M.A. tests and instructor's school; Post Field, artillery observation and photography; Selfridge Field, aerial gunnery and pursuit; Ellington Field, bombing and night flying; at present, 1st Lt. in Aviation Section of Signal Reserve Corps.
Flying Rating: Reserve Military Aviator, Feb. 1917.
War Service: Oct. 22, 1916 to Jan. 1918.
Member: Aero Club of America.
Present Occupation: Salesman, Trade Lithograph Co.
Address: 112 East 19th St.; home, 290 East 12th St., New York City.

James Edmond Fechet

FECHET, JAMES EDMOND, Chief of Training and Operations Group; born, Ft. Ringgold, Tex., Aug. 21, 1877; son of Edmond G. Fechet and Rachel (Forsyth) Fechet; married, Catherine Luhn, April 10, 1907.
Educated: Public schools of Jackson, Ohio; Worthington Academy, Lincoln, Nebr.; University of Nebraska.
Professional: Enlisted in 6th U. S. Cavalry, April 1898; discharged, Aug. 9, 1900; commissioned 2nd Lt., 9th Cavalry, Aug. 1900; 1st Lt., 1901; Capt., March 1911; Maj., June 1920; Lt. Col., July 1920.
Aeronautical Activities: Started flying, Oct. 1917.
Flying Rating: Junior Military Aviator, Nov. 1918; Airplane Pilot, June 1920.
War Service: Lt. Col. A.S.S.C., Aug. 1917; Col., Feb. 1918; Commanding Officer, Scott Field, Carlstrom Field, Dorr Field, and Kelly Field; Supervisor of Aeronautics for Southwest, Sept. 1918 to May 1919.
Member: Army and Navy Club (Wash.).
Present Occupation: Chief of Training and Operations Group-Office; Chief of Air Service.
Address: Munitions Bldg.; home, 3614 McKinley St., N. W., Washington, D. C.

Francis Bentley Waterman

WATERMAN, FRANCIS BENTLEY, Ensign, Reserve Force; born, Selma, Calif., Feb. 21, 1897; son of Edward B. Waterman and Ida B. (Francisco) Waterman.
Educated: Elementary and high schools, Fresno, Calif.; A.B. 1919, University of California.
Professional: Sept. 1919 to Dec. 1920, highway construction in Nevada. Part of this time was with State Highway Department and Pitt-Taylor Syndicate, a contracting firm.
Aeronautical Activities: March 1918, enlisted Naval Aviation; Ground School at M. I. T., Cambridge, Mass.; Air Stations, Key West, Miami, Pensacola.
Flying Rating: Ensign and Naval Aviator No. 1821.
Present Occupation: On active duty at Naval Air Station, San Diego, Calif.
Address: Naval Air Station, San Diego, Calif.; home, Box 185, Berkeley, Calif.

Charles Herbert Colvin

COLVIN, CHARLES HERBERT, Aeronautical Industry; born, Sterling, Mass., March 4, 1893; son of Fred H. Colvin and Mary (Loring) Colvin; married, Clara Stroud, Sept. 28, 1918.
Educated: Grammar and high schools, East Orange, N. J.; M.E. 1914, Stevens Institute of Technology.
Professional: Curtiss Motor Co., 1913; Curtiss Aeroplane Co., 1913; Sperry Gyroscope Co., 1914-1919; Pioneer Instrument Co., 1919 to date.
Aeronautical Activities: 1916, Test Engineer; flight tests on instruments, automatic controls and aerial torpedoes.
Member: American Society of Mechanical Engineers; Franklin Institute.
Present Occupation: General Manager (member of firm), Pioneer Instrument Co.
Address: 136 Havemeyer St., home, 61 Poplar St., Brooklyn, N. Y.

William Wallace Hosp

HOSP, WILLIAM WALLACE, Commercial Aviator; born, Washington, D. C., Oct. 18, 1890; son of John Hosp and Mary Hosp.
Educated: Public school; business high school; four years practical training in mechanics; School of Military Aeronautics, State University of Texas.
Professional: Executive, Aviation School, 1915; exhibition flying, 1916-1917; airplane manufacturing, 1919-1920; aviation, advertising, selling, 1920 to present.
Aeronautical Activities: Assisted in organising O. E. Williams School of Aviation, Fenton, Mich., Nov. 1915; assisted Anthony Hoesel in building first O. E. Williams, 120 hp. airplane motor, Dec. 1915; assisted in organizing Flint Aircraft Co., Flint, Mich., April 1917; entered U. S. Military School of Aeronautics, Dec. 1917; test pilot for Cantilever Airplane Co., April 1919; associated with Prof. David Todd in Aeronautical and Business Research, June 1920; established Aerial Sales Service for associating aviation with free lance advertising and selling, Sept. 1920.
Flying Rating: Reserve Military Aviator.
War Service: Enlisted Signal Reserve Corps, Nov. 1917; commissioned 2nd Lieut., R.M.A. A.S.A., Nov. 1918; assigned flying instructor; completed bombing course at Ellington Field, Jan. 1919; assigned to photographic stage, March 1919.
Member: Aero Club of America.
Present Occupation: Aviation-Selling.(Manager, Aerial Sales Service).
Address: 50 Union Square; home, Aero Club, 11 East 38th St., New York, N. Y.

Walter Hale Frank

FRANK, WALTER HALE, Major, Air Service; born, New York, April 23, 1886; son of Dr. Albert A. Frank and Agnes (House) Frank; married, Hazel Muriel Smith, June 25, 1913.
Educated: Grammar and high schools of Buffalo, N. Y.; U. S. Military Academy, 1910.
Professional: 2nd Lieut., 5th Inf., June 15, 1910; 25th Inf., June 1, 1914; 1st Lieut., Inf., July 1, 1916; Capt., 34th Inf., May 15, 1917; Maj., Signel Corps, Oct. 23, 1917; Maj., Air Service, July 1, 1920.
Aeronautical Activities: Assigned to Air Service, Aug. 20, 1917; Kelly Field to Nov., 20, 1917; Executive Officer and Commanding Officer, Ellington Field, Nov. 1917 to Nov. 1918; Executive Officer, Training Section, Division of Military Aeronautics,, Washington, D. C., Nov. 1918 to Feb. 1919; Ass't Administrative Executive, Office Chief of Air Service, Feb. 1919 to Sept. 1919; Member of Advisory Board, Sept. 1919 to Nov. 1919; Air Service Engineering School, Nov. 1919 to Sept. 1920; Executive to Chief of Air Service, Sept. 1920 to date.
Flying Rating: Junior Military Aviator, Aug. 1918; Airplane Pilot, June 1920.
Member: Army and Navy Club.
Present Occupation: Executive, Office Chief of Air Service.
Address: Munitions Bldg.; home, 1801-16th St., N. W., Washington, D. C.

Aircraft and Disarmament

By Our Washington Correspondent

One of the most serious problems that will come before the international conference on the limitation of armaments, to meet in Washington in November at the call of President Harding, will be that relating to aircraft. Officials are waking up to the enormity of the question of how any real curtailment of fighting forces can be accomplished while the aircraft industry at the same time is being fostered.

If there ever was any doubt of the military value of airplanes, balloons and dirigibles it vanished during the bombing tests held off the Virginia Capes in June and July featured by the sinking of the one time German war vessels alloted to the United States under an Allied agreement. This demonstration, consequently, taken into consideration with the purpose of the forthcoming conference offers one of the most vexing features of arms limitation with which the American and other delegates will have to deal.

Army and Navy flying officers, notably Major General Menoher, the chief, and Brig. Gen. Mitchell, the assistant chief of the Army Air Service, and Rear Admiral Moffett, chief of the Naval Bureau of Aeronautics, are giving close study to the problem in the expectation that sooner or later they will be called upon for advice as to how to proceed with the limitation of aerial armament. While they have refrained from making comment for publication it is known that they have collected much interesting information.

Up to this time Secretary Hughes and Senator Lodge, of the Senate Foreign Relations committee, are the only two American delegates announced. It is the expectation that the American delegation will be made up of five or six—President Harding has not decided definitely. Those who have been following the developments think it is logical that at least one high ranking officer of the Army and one from the Navy will be designated for the positions, since expert advice would be required for any successful curtailment policy.

But up to this time no move of such character has been made, and it is causing not a little worry among the officer personnel of the Army and Navy flying services. They are afraid that the aircraft situation may not be regarded maturely, since aircraft is a new factor in war, while at the same time its peace-time development adds greatly to preparedness.

In view of the extreme delicacy of the international features of the coming conference none of the officers in authority will discuss at this time the case of aircraft in connection with a possible curtailment—discuss, that is, for publication. But it is possible to present herewith, anonymously, a composite opinion well worth considering:—

"The rapid development of aircraft in warfare indicates that it soon will be, if it is not even now, the force with which future battles will be won or lost. It was demonstrated when the airplanes sunk the German ships, and it will be demonstrated again at the coming Army tests.

"When airplane carriers are considered—and it should not be forgotten that Great Britain has six airplane carriers on the programme now and Japan two—the value of airplanes in warfare at sea is greatly increased.

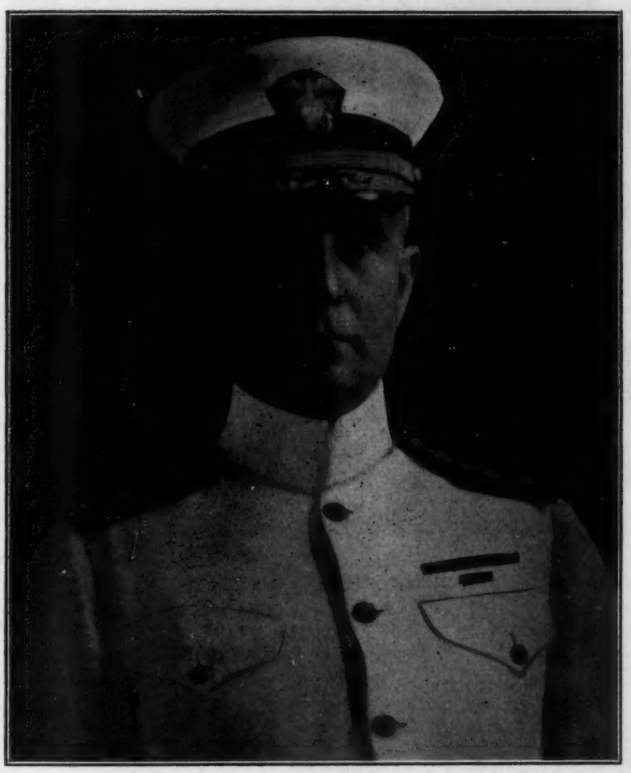
"Nobody knows as yet, of course, just how far the coming conference intends to go into the question of limiting armaments, but if the case is to be considered thoroughly, and it naturally will be, the matter of aircraft will be one of the chief subjects for discussion.

"The one outstanding thing is that a nation does not have to have a large fleet of airplanes or airships to be prepared for war of the deadliest kind. Aircraft, even when engaged in peace-time pursuits, are potential armament, and there is no getting away from it.

"To imagine for an instant that the conference contemplates curtailing aircraft development, because of this, is ridiculous. It is the judgment of the keenest minds of the Army and Navy that nothing of this kind would be considered for a minute. There is no stopping aircraft development at this stage. It is bigger than anybody or anything.

"The result will be, even if a holiday in building battleships is agreed upon, that the nation which has a good aircraft industry and plenty of airplanes and airships, no matter what the type will always be prepared—prepared far better than the nation that has none.

"It might be that some sort of an agreeement would be proposed to limit the number of scouting and bombing airplanes attached to the Army and Navy, but such an agreement would mean nothing at all and would be better left unmade. For the plain truth is that any small, fast airplane—of the sporting type, perhaps—would be useful for scouting. And, further, any airplane capable of carrying a heavy load at a fair rate of speed would be available for the carrying of bombs.



REAR ADMIRAL W. F. FULLAM, WHOSE ARTICLES ON NAVAL AVIATION ARE STIRRING UP WIDESPREAD COMMENT IN NAVAL CIRCLES ALL OVER THE WORLD

"It looks very much to me as though the matter of limiting arms under an agreement, such as has been proposed, would be impossible to work out, due to the airplane if to nothing else."

The Bureau of Naval Aeronautics

Rear Admiral Moffett, chief of the Naval Bureau of Aeronautics, which recently was organized under authority of the Secretary of the Navy, has announced that while the bureau went into effect on Sept. 1 it will not be functioning entirely before the end of the month.

This is due to the necessity for transfering various work from other bureaus of the Navy Department, such as the Bureau of Navigation and the Bureau of Construction and Repair. The bureau has taken new offices in the Navy Department Building, now occupying a suite on the third floor of the second wing.

The New Glenn Martin High Lift Wing

By Clarence D. Hanscom

Chief Engineer, Glenn L. Martin Co.

It is now generally admitted that the relative advantages of internal and external wing bracing must be studied more carefully than heretofore. The Glenn L. Martin Co., recognizing this fact, began last year to develop several new wings of rather thick section.

To lessen the greatest disadvantage of the thick wing, its aerodynamic inefficiency, flaps were employed both at the leading and trailing edges. The thick wing is ideal for the practical use of this device, since the hinges are simple, and the controls partially or wholly internal. The results obtained proved this judgment correct. The new wings were entirely successful.

The base sections, from which the new wings were designed, were three: the U.S.A.27, the Dl, and the Hl. The U.S.A.27 needs no explanation. It is far superior to any other wing of moderate thickness; and the section developed from it proved the best of those tested. The Dl was a wing designed by G. M. Denkinger, and unpublished at the time of the tests. The Hl was one of my own wings, also unpublished until this year. A curve is shown for the latter; but better ones include a spindle intereference correction. None of the other curves have this correction applied. Both had unusual qualities at certain angles, as indicated by the characteristic curves. The H3a and H3b sections are also shown, although they were not used as bases for development. They indicate that the Hl is sensitive to slight changes of shape.

The new wings are called Glenn Martin 1 to 6. No. 1 was based on the Hl, No. 2 on the U.S.A.27, No. 3 on purely theoretical deductions, No. 4 on the Hl, No. 5 on the Dl, and N. 6 on the Hl. Nos. 2 and 4 are the best, with No. 5 a good third. Accordingly, flaps were fitted to Nos. 2 and 4, producing Nos. 2F and 4F. No. 4F is clearly inferior to No. 2F, curves of which are shown.

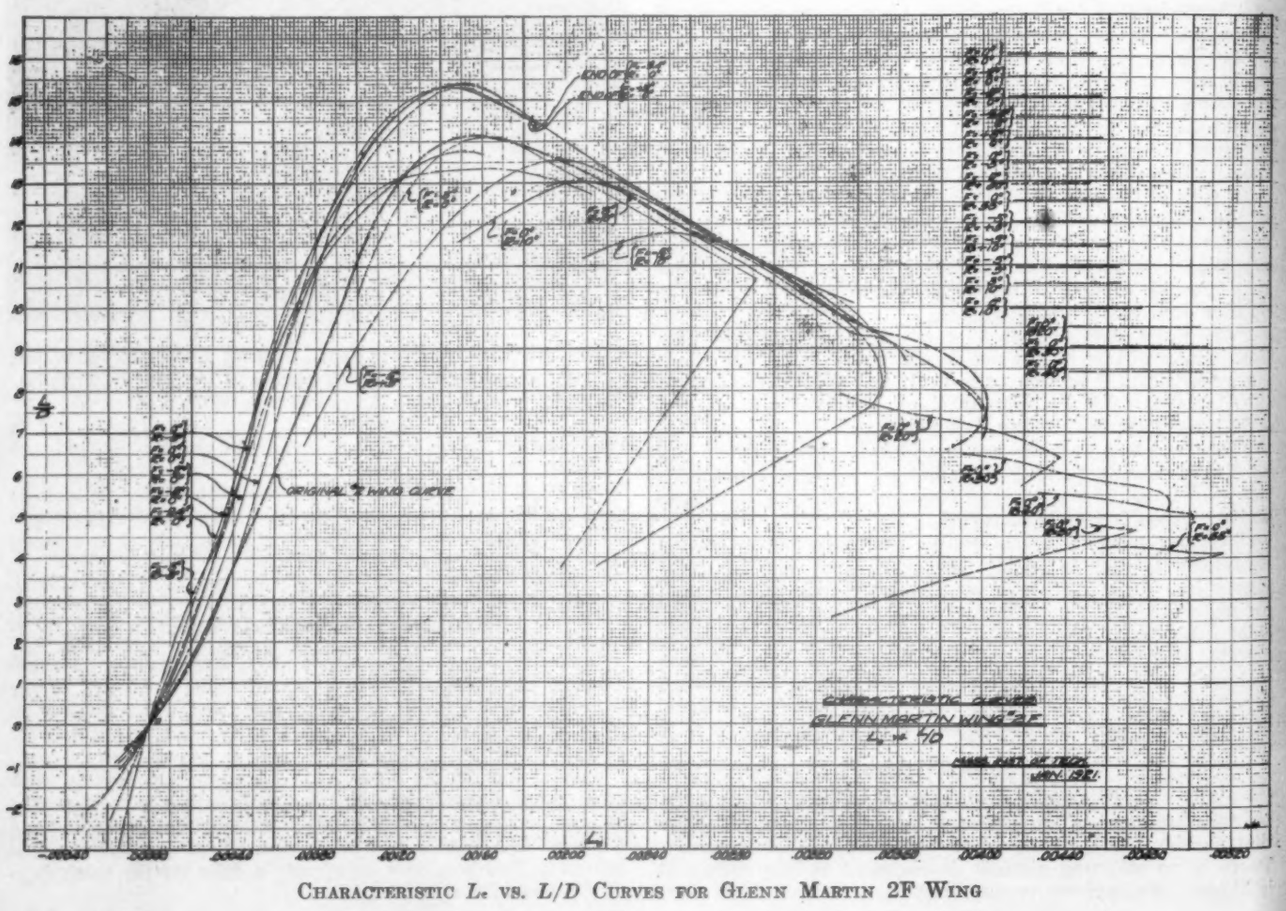
Glen Martin 2F, then, is to be compared with other existing wings. In the first place it is a thick section permitting of deep internal bracing.

The maximum lift coefficient is 0.00516, nearly twice that of the R.A.F.15. The Handley Page wing (data on which has appeared since the announcement of the Glenn Martin 2F) has a much higher lift; but I am acquainted with no other report recording a lift approaching that of Glenn Martin 2F. In other words, the wings can be much smaller (other things being equal) if the Glenn Martin 2F is used in place of any of the usual sections.

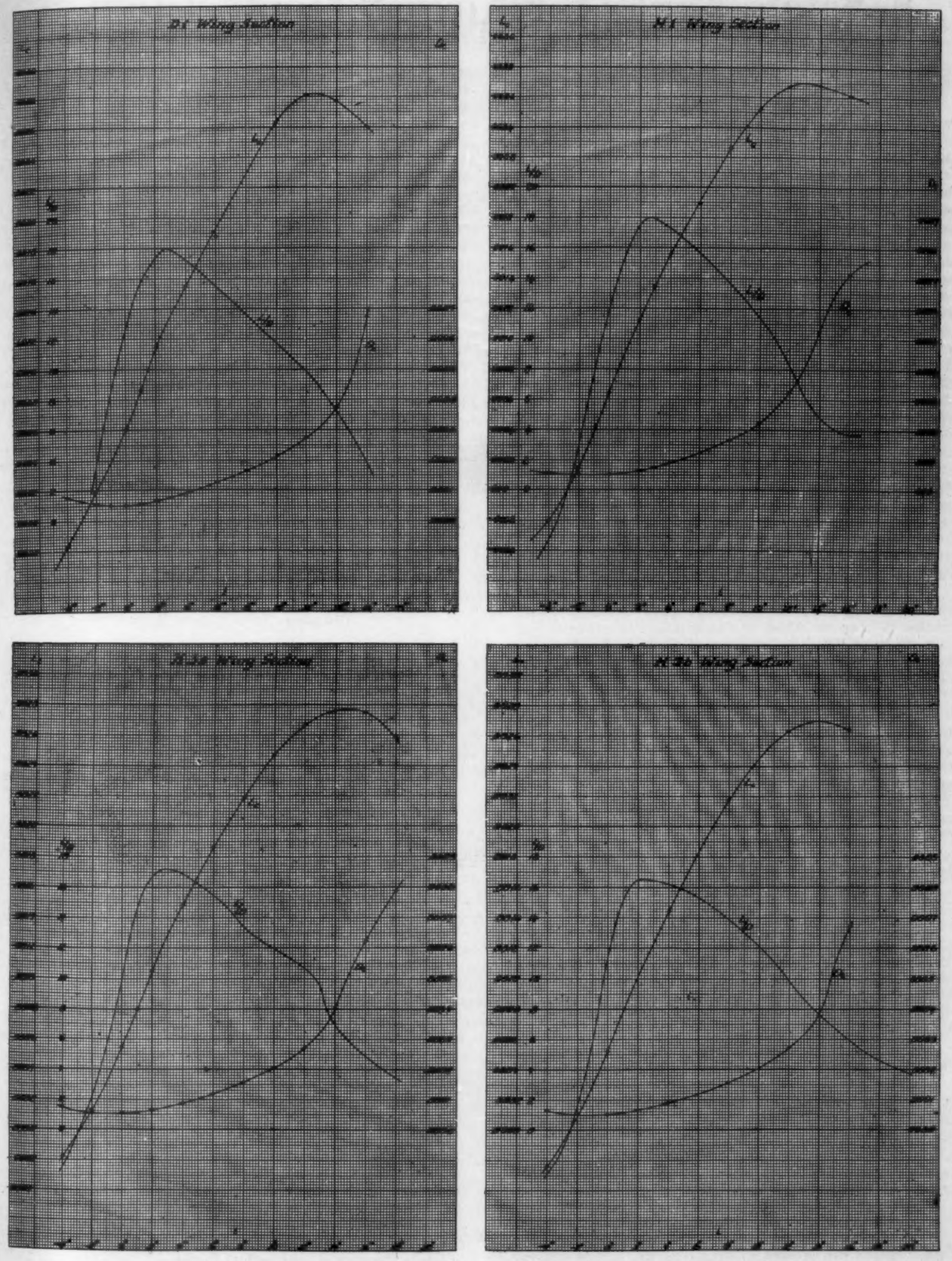
Another exceptional quality of this wing is its efficiency at high speeds. Heretofore, the R.A.F.15 has had no rival for use on fast planes. Recently the Parker variable camber wing proved better than even the R.A.F.15; but the Parker wing has relatively low maximum lift, and is at least difficult to build. The Glenn Martin 2F, while not as efficient at high speeds as the Parker wing, is much superior to the R.A.F.15; and it far surpasses both in maximum lift. Moreover, no structural difficulties interfere with its use.

The latter consideration is by no means negligible. While development work is needed on both the Handley Page and the Parker wings, the Glenn Martin 2F is immediately available. Ordinary ailerons may be employed, or the flaps used as ailerons, as is done by the Fairey Aviation Co.

For racing planes, it would appear that an internally braced wing with flaps, like the Glenn Martin 2F, is almost essential. For heavy planes, the drag would be high at low speeds; and the plane would act like the Fokker-Junkers, which is slow



CHARACTERISTIC L_c VS. L/D CURVES FOR GLENN MARTIN 2F WING



in pulling up from the ground, but maneuvers well in the air. If reduction of span or area is necessary, however, that is not a serious disadvantage. It is a minor penalty for high lift, and merely necessitates a slightly longer run in the take-off. To compensate, the plane would slow up quickly in landing. Witnesses of the Handley Page test flights will doubtless recall this feature, which is common to all high-lift wings. Altogether, Glenn Martin 2F appears to be at present one of the half dozen wings which are most useful to the airplane designer and aeronautical engineer.

Safety Tanks for Aircraft Competition

The following communique has been received from the British Air Ministry:

The possibility of aircraft catching fire in the air has been almost entirely eliminated by care in design and inspection, but such precautions are not sufficient to protect in every case an airplane from the results of a crash. One of the main objects still to be attained is to ensure that in a heavy landing or a crash the fuel tanks on an aircraft, even though seriously damaged, will withstand the shock to which they may be subjected without either bursting or leaking.

Accordingly, with the object of obtaining for use in service and commercial aircraft safety tanks which will fulfill these conditions and which will at the same time withstand the effects of enemy action by machine gun and shell fire a competition for safety fuel tanks has been arranged to commence on December 1, 1921. Prizes to the extent of £2000 will be awarded to the entrants of the tanks which are considered best. The first prize will be £1,400, the second £400 and the third £200. The competition will be held at a place which will be decided upon later.

Any competitor may enter several different types of tanks, but two specimens of each tank must be supplied for preliminary tests and four for the final tests. Entries, which should be addressed to the Secretary, (R. D. 1) Air Ministry, Kingsway, London, W.C.2., marked "Safety Fuel Tank Competition", will be received until Nov. 7, 1921. These should be made on a form which will be supplied on request.

The control of the competition will be in the hands of a judges committee appointed by the Air Council. Their decision as to awards shall be final and without appeal.

Tanks should be constructed so as to prevent as far as possible leakage or ignition of fuel when subjected to stresses similar to those to which the tank would be subjected in an aircraft crash, and to machine gun fire using incendiary, armour piercing, or explosive ammunition. Equal importance is attached to these requirements.

A tank is to be capable of being fitted within a space of 2 ft. 6 in. by 2 ft. by 2 ft. and to have a capacity which must be within 5 per cent of 30 gal., but any shape of tank will be accepted for competition. All the necessary fittings to enable the tank to be mounted in a structure for testing purposes must be supplied by the competitor.

The maximum weight, which would only be justified by very exceptional qualities, should not exceed 1.75 lb. complete with fittings per gallon capacity. Tanks exceeding this figure will not be disqualified, but great importance will be attached to low weight.

In all cases the tank is to be complete with the necessary fittings to enable it to perform its functions of supplying fuel to a fixed point. In the case of tanks designed to incorporate leak detectors and similar instruments and devices, these will be fitted in such a manner as to show their efficiency under test, and will be included in the weight. In every case there must be at least one filler and also unions for supply and delivery connection, one of the latter at the top, the other at the bottom of the tank.

The relative importance of other characteristics of the tanks will be considered in the following order:—

Light weight.
Durability under service conditions in the absence of any accident.*
Indifference to extremes of temperature.
Adaptability of design to large capacities.
Simplicity of construction.
Adaptability of design to various shapes.
Accessibility of fittings.
Cost of production.

All tanks will be submitted to preliminary trials. The three best types will be selected by the judges for a final trial.

For the preliminary tests both tanks submitted will be subjected to a crashing test of the following nature. Each tank will be mounted in a wooden structure and located behind a concrete body formed to represent an engine. The tank will be released down a wire ropeway approximately 100 ft. high, so arranged that the structure will strike the ground at an angle of not less than 45 deg. from the horizontal and will be free to turn over. This will ensure as far as possible the conditions prevailing in a typical aircraft crash. The tank will contain 22 gal. of petrol which will be supplied by the Air Ministry.

In the four tanks supplied for the final tests minor modifications of the original design may be made, provided the judges have previously decided that the modification is one of detail and not fundamental principle. The tanks will be required to undergo a similar crashing test as in the preliminary stages and also a firing test in which they will be subjected to machine-gun fire with ammunition capable of penetrating the ordinary type of mild steel fuel tank and leaving small entry and large exit holes when the tank is struck below fuel level, and exploding and igniting the fuel either on contact or after penetration.

A series of bursts of five rounds each will be fired at a range of 50 yd., the tank being examined after each burst. The angle of fire will be at the discretion of the judges.

At any time during the competition the judges may impose such other tests (e.g. to determine the resistance to acceleration etc.) as they may desire in order to demonstrate the relative merits of competing tanks.

There will be an interval of at least eight weeks between the preliminary and final tests.

* In the case of scout aircraft the stress due to acceleration may amount to three or four times that due to gravity.

Determining Ground Speed

A mathematical system for determining the ground speed of an airplane during flight, as well as wind direction and velocity at any altitude, which shows considerable promise of proving an interesting and highly useful solution of these heretofore difficult problems in the longer cross-country, photographic, and bombing operations, has recently been evolved by Major Junius W. Jones, A. S., who has just completed a series of tests in these subjects incidental to his routine air missions as a student pilot at the Air Service Observation School, Post Field.

The system devolves upon the known geometric relationship between three factors, all of which may be readily determined by the pilot while in flight; namely, air speed, drift angle, and time each way between any two nearby points on the ground. An exact mathematical height above the earth, independent of the data given at the moment by the aneroid instrument, may also be determined by the system worked out by Major Jones, and would doubtless prove of great advantage over the altimeter, which is necessarily limited in accuracy by zero orientation at the home landing field, in cases where exact scale photography were to be carried out over distant objectives of varying elevation above sea level, or when, in artillery work the Battery Commander is requested to lay his guns on the plane, the exact altitude of the ship above the designated target forming the base line of triangulation by which accurate range may be determined.

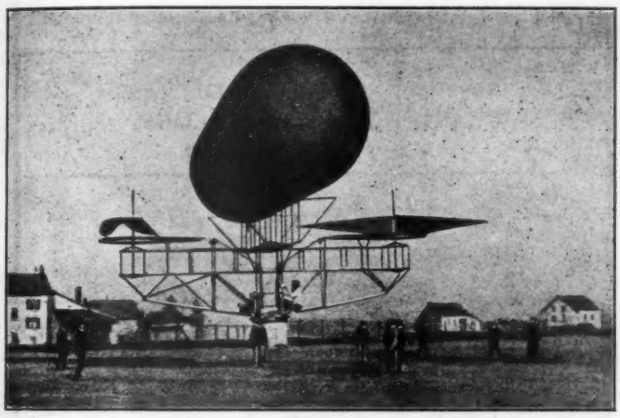
To reduce the application of his system to a practical basis so that the pilot's attention need not be absorbed in calculation, which the inventor modestly admits must lead to realms somewhat abstruse before the integrations employed may be directly applied, Major Jones has resolved all formulae into a single simple chart, consisting of a series of arcs with their intersecting and correlated curves, a photostat copy of which has already been published in practical scale for use in the cockpit. By this chart it is necessary only for the pilot to adapt the simple arithmetical factors of time, airspeed and drift angle to a base line of the chart, which is then followed through its various intersections graphically to obtain the desired information concerning ground speed, wind direction and velocity, compass course, or altitude, etc.

The Oehmichen Helicopter

In view of the considerable attention experiments with helicopters are eliciting all over the world, the following particulars regarding the Oehmichen helicopter will be of interest.

The machine was built to the designs of E. Oemichen in the Peugeot automobile works at Valentigney, France. It consists essentially of an elongated framework, built up of wooden elements in the manner of an airplane fuselage, in the center of which is mounted a 25 hp. Dutheil-Chalmers engine. This engine is of the 2-cyl. horizontal opposed type and dates back to 1909, when it was used on several experimental airplanes. The reason why the inventor is using such an antiquated engine is probably that no modern airplane engine of such low horsepower was available. At either extremity of the framework a two-bladed lifting screw of 21 ft. diameter is fitted. The transmission to the engine is by belt drive. Athwartship, that is, transversely to the fuselage, there is a light superstructure to which is fastened a balloon of 5000 cu. ft. capacity.

The weight of the helicopter, including water, oil, fuel and the pilot, is 739 lb. As the lifting force of the balloon equals 156 lb., it follows that the lifting force exerted by the two



THE OEHMICHEN HELICOPTER WITH ITS STABILIZING BALLOON

screws is 583 lb. This is equivalent to a power loading of 23.3 lb./hp., which is considerably better than that theoretically computed from ground tests for the Pateras-Pescara helicopter, which machine is reported to have recently made an ascent at Barcelona, Spain.

It should be noted that the reason M. Oehmichen attached a balloon to his helicopter is not because of the additional lift it procures, but because of the stabilizing effect it introduces. Indeed, in the course of the six free ascents made it was noted that whereas no oscillations occurred in the longitudinal sense, the machine rolled at times rather heavily from one side to the other. This rolling of the helicopter may however be due to the low altitude at which the tests were made, namely, between 2 and 6 ft., for the slipstream would naturally hit the ground and exert a counter pressure. Given even a slight cross wind, this would lead to irregular oscillations around the longitudinal axis. As the wind during some of the tests was blowing at the rate of 5 ft. per second and the oscillations occurred mainly on windy days, the contention of the inventor seems justified by facts. The average duration of the ascents was of one minute and some of the tests were made before representatives of the Technical Section of the French Air Force.

It is interesting to learn that the starting point of M. Oehmichen's experiments with helicopters was on investigation he conducted with a view to determining the mechanism of animal flight. In the course of this investigation the inventor succeeded in verifying by scientific methods the existence of certain unknown laws of hydraulics which for some time he had assumed to exist. These laws prove, according to his claim, that certain birds and insects are capable of utilizing in flight the suction generated by their progress through the air. In other words, the extraordinary efficiency of bird flight would really be based on the recuperation of energy.

To determine the exact nature of this phenomenon, M. Oehmichen constructed a series of instruments by the use of which he hoped to register the flow of these so-called reverse or suction currents. Among these instruments the strobograph, or electrical registering cinematograph, was mainly instrumental in the final success of the investigation. Basing himself on the curious analogy that appeared to exist between these phenomena of recuperation and others of a similar kind which are known to occur in electric alternating currents, which he had particularly studied, M. Oehmichen finally succeeded in deducting the fundamental laws of this new phenomenon of aerodynamics. These laws together with his observations M. Oehmichen has published in a volume under the title *Nos Maîtres, les Oiseaux* (Our Masters, the Birds).

As a result of these investigations M. Oehmichen decided to attempt to reproduce mechanically the principle of recuperation he had discovered. His efforts centered on turning the alternating motion of bird wings into a rotating motion, which latter is much more efficient from the mechanical viewpoint. He thus built a series of lifting screws incorporating the principle of recuperation and the results he obtained experimentally were highly gratifying. The screws which are fitted to the helicopter described above are not of the most efficient type developed by M. Oehmichen, but simplicity of construction prompted him to use them in preference to more efficient and more complicated screws. The sustentation factor of these screws is 0.36, and they are said to be 20 per cent more efficient than any other propeller developed to date.

Automobilia, to whom we are indebted for these particulars, adds that in order to overcome the instability of the machine M. Oehmichen intends to make the screws rotate in the same direction, and to prevent the machine from turning around its vertical axis, the propeller shafts will be inclined 9 deg. Thus a horizontal component would be introduced which would counteract the gyroscopic effects of the propellers.

Aviation in Egypt

Direct areial communication between Egypt and Mesopotamia is now established three airplanes having left Bagdad at 4:30 a. m. on June 30 with three stops, reaching Cairo at 7:45 p. m. the same day. In the other direction there has been an even better flight, for Air Vice-Marshal Sir G. Salmond left Heliopolis at dawn on July 9 and with two stops for refueling landed in Bagdad 12 hours later. The aerial route via Amman and Ramadi to Bagdad, which the Middle East Air Force has been surveying for some time, may now be considered open. This renders unnecessary any further British traffic by way of the Damascus-Palmyra-Abu Kemal route which has hitherto been followed. The possibilities of this new route are indicated by the fact that Sir G. Salmond took with him official correspondence which was delivered in Bagdad the same day instead of a month later, as has hitherto been necessary.

Philippine Is. Air Service

There is a possibility that the Philippine Air Service will be taken over by the Army or by a private enterprise, as the Insular Government is desirous of being relieved of the expense of maintaining the service. A conference between officials of the Army and the Philippine Government was held on July 8 with regard to the proposed transfer, but no decision was reached in the matter. A private company, of which E. J. Hamilton Stevenot is the head, is said to be making a bid for the aeronautical property of the Philippine Government, but until a proposition in writing is submitted no action can be taken thereon. Further meetings will be held between the Military and Insular authorities with a view to the ultimate settlement of this matter.

Airdrome Notes

Lawton, Okla.

A commercial airdrome has been established at this place. Information as to ground markings and service are not yet available.

Lincoln, Neb.

The Nebraska Aircraft Corp. announce that their re-organization will not affect the maintenance of their airdrome on South Twentieth Street across from the Country Club.

Eastmoreland, Ore.

Broomfield aviation field in Eastmoreland is to be converted into a golf course within the next month. The airdrome, which was established by the city over a year and a half ago, has been so little used by aircraft that it will be abandoned.

Peoria, Ill.

The Peoria Aircraft Club is shortly opening an airdrome directly north of the city. Hangar space will be available.

Gallaudet Plant Busy

The Gallaudet plant, directly on Narrangansett Bay at East Greenwich, R. I., as far as aircraft are concerned, has been converted into a metal working shop. Outside of completing an order for the conversion of D.H.-4 machines, no wood enters into any of their present aircraft work except engine bearers. Of the three power nacelles for the Giant Boat, one has been completed and has passed its official tests. The structural work on the other two is nearing completion.

Other new and interesting work is an all-metal monoplane day bomber with a span of approximately 76 ft. designed for the 16 cylinder U.S.A. engine. Another all-metal machine under construction is the PW-4 single-seater pursuit biplane, which embodies several novel features which cannot yet be divulged. Designs for an all-metal monoplane of greater dimensions than the one mentioned above has also been accepted by the Army, while several other competitive designs, prepared by Chief Engineer Edson Gallaudet, have been purchased by the Government.

Another Navy job to the design of Capt. James V. Martin is the MK-4 single pontoon Navy messenger machine with a Lawrance 3-cyl. aircooled radial engine. This is a very small single-seater. The first of these machines has been accepted by the Navy and the other three are nearing completion.

Approximately 200 people are at present engaged on aircraft work at the Gallaudet plant, while about 75 others are engaged in the manufacture of "Feather Board" an improved light winding frame of light wood, covered drum-tight with heavy paper, for shipping and displaying all kinds of textile fabrics, and "Spur Cap" shells, a heavier cylindrical reel with a pressed steel cap on each end for handling textiles, rubberized fabrics, wall paper, etc., in the mills and in transit. Large production and sales of these two non-aviation products since the armistice has placed the Gallaudet Co. in a strong position and enabled them to proceed with a large amount of expensive engineering development work for the Army and Navy air services.

New South American Altitude Mark

Eduardo Olivero, an Argentine airman, who served in the Italian Army during the war where he attained the rank of captain and won five medals, has just set a new South American flying record for altitude by attaining a height of 26,240 ft. in a S.V.A. machine. He may have gone higher, for 8,000 meters was the most the instrument would register, and Olivero lost consciousness for some time on reaching this height. The record height was reached in 1 hr. and 15 min. and the flight was made in exceptionally cold weather.

Pioneer Instruments for the Navy

The Turn Indicator manufactured by the Pioneer Instrument Co. of Brooklyn, N. Y., has been adopted by the Navy, after a competition involving various types of instruments, and having completed the order for the Navy the company now has a stock of these instruments ready for immediate shipment to customers.

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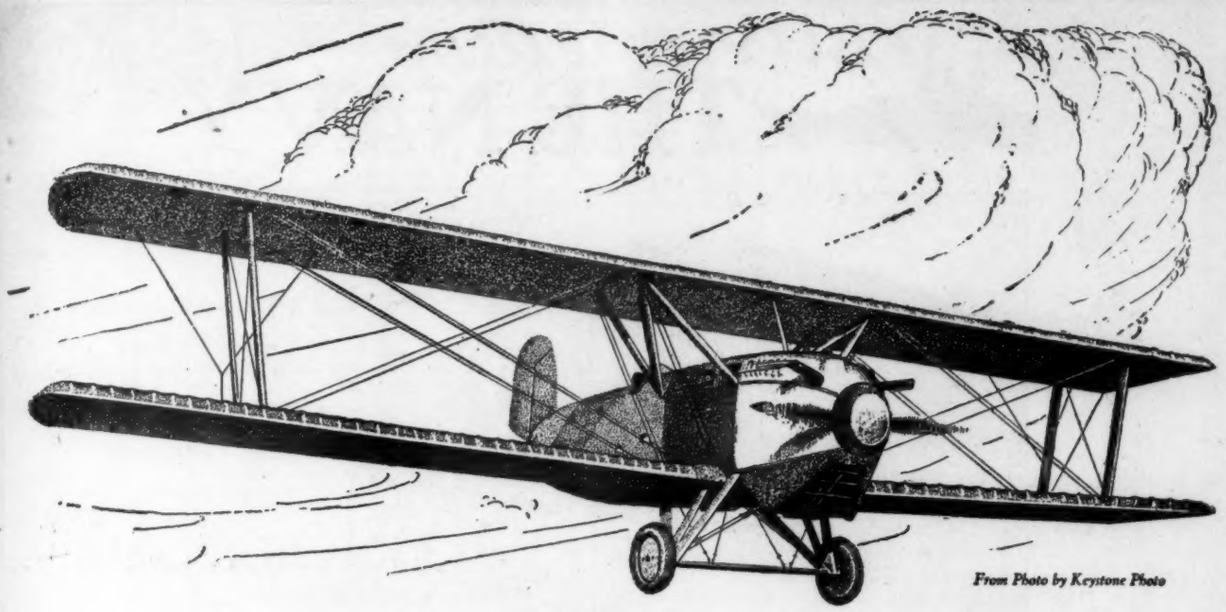

From Photo by Keystone Photo

A Plane that holds Two Records—

MANY notable planes have been designed by Mr. Donald Douglas, former Chief Engineer of the Glenn L. Martin Company. But none of them is more remarkable than the "Cloudster," recently built by his own company — the Davis-Douglas Company of Los Angeles.

The "Cloudster" weighs only 3850 lbs., yet it has carried a useful load of over 5,000 lbs.—the heaviest load ever carried by a single-engined plane. And the "Cloudster" also holds the official Pacific Coast altitude record of 19,160 feet.

From long experience Mr. Douglas knows that Valspar is the ideal varnish for airplane use—that it is proof against water and wear, vibration and weather.

From tip to tip the "Cloudster" is Valsparred, of course!

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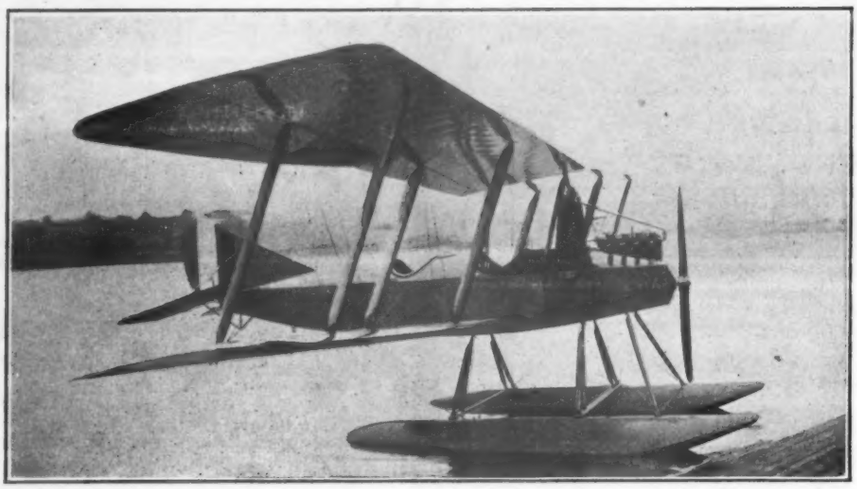

·Boeing Sea-Plane·

The *Boeing Sea-Plane* is a tractor biplane, equipped with a *Hall-Scott 100-horsepower engine*. It is a two-float type with two places and dual control wheels. The draft when fully loaded is fourteen inches The wing spread is about 44 feet and the supporting surface, including ailerons is 495 square feet. The weight light, including instruments and water is 1,940 pounds and the total weight is 2,450 pounds, which gives 5 pounds per square foot and 24.6 pounds per horsepower

The maximum and landing speeds are 73 and 46 miles per hour respectively, the climb is 2,500 feet in ten minutes and the endurance is 2.2 hours.

The *Boeing Sea-Plane* is manufactured by the Boeing Airplane Company, Seattle, Wash.

The planes are located at the Naval Air Station, San Diego, Calif.

They are new and unused and have not been removed from the original packing crates.

Cost (approximately) $10,300.00. Sale price $1,500.00.
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